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ABSTRACT

This report describes an evaluation study designed to examine two major aspects of a partnership program sponsored by the Science and Mathematics Network of Central Ohio. Those aspects are: (1) changes in partners' perceptions about partnering; and (2) science and mathematics education and the impact of partnerships on the instructional process. Two major evaluation activities were employed to accomplish the goals. The first activity had to do with the results from a questionnaire used by the Network to collect comparative before and after data on perceptions. The questionnaire contained scaled and open-ended items designed to capture participants' attitudes toward partnering and science and mathematics education. The second major evaluation activity to examine partners' perceptions toward the impact of the partnership on instructional strategies was an interview study consisting of semi-structured telephone interviews with questions focused on the nature of the partnering relationship and corresponding changes in instructional practices. The report also contains information divided into the following categories: (1) history of network evaluations; (2) 1996 evaluations; (3) methodology; (4) major results and findings; and (5) appendices. (DDR)

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Write the mind

Evaluating the Impact of Network Partnerships

Science & Mathematics Network of Central Ohio

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Science & Mathematics Network
of Central Ohio
445 King Avenue
Columbus, OH 43201

HISTORY OF NETWORK EVALUATIONS

"My practices have changed, especially in science. I am feeling more comfortable with science concepts and have developed more self-esteem in teaching science."

(Denise Ducharme, Teacher)

Comprehensive Evaluation Studies 1992-1996

OVERVIEW

Since its inception, the Science & Mathematics Network has conducted rigorous evaluations of both the effectiveness of its programs and services as well as the impact of the partnerships it assists. This packet of information summarizes the evaluation data gathered over the past four years, and also provides in-depth information on the extensive study conducted during the 1995-96 school year.

The focus and nature of the evaluations commissioned by the Network have evolved over the past four years. Initial studies (1992-93) examined the effectiveness of Network training programs and then developed a further definition of characteristics of successful partnerships. Having established those important factors, the following years' evaluations (1993-95) took an in-depth look at several partnerships to gauge the impact of partnerships on student and teacher attitudes and instructional practices. The emphasis of the third evaluation (1995-96) turned to the impact of partnerships on students. To obtain the most accurate picture, a multifaceted approach was used to examine impact on students from several perspectives.

All of the evaluations conducted by the Network have contributed important information which has guided the development of programs and affirmed that the reform-based partnerships advocated by the Network are leading to improved mathematics and science teaching and learning. The 1995-96 evaluation additionally establishes an excellent evaluation procedure as well as a strong set of baseline data that will allow the Network to track the impact of partnerships on students over time.

Summaries of the evaluations and other indicators of achievement follow.

1992 - 93 Evaluation

I. Purpose

The goals of the evaluation study were to examine two major aspects of the Partnership Program:

1. changes in partners' perceptions about partnering as well as science and mathematics education, and
2. the impact of partnerships on the instructional process.

II. Methodology

Two evaluation activities were planned to accomplish the evaluation goals. Each is discussed separately below. To examine changes in partners' perceptions toward partnering and science and mathematics education, it was decided to analyze results from a questionnaire being used by the Network to collect comparative "before and after" data on perceptions. The questionnaire contained scaled and open-ended items designed to capture participants' attitudes toward partnering and science and mathematics education. The questionnaire was administered prior to attending a Network partnering institute and again at the conclusion of a year of partnering.

The second major evaluation activity to examine partners' perceptions toward the impact of the partnership on instructional processes was an interview study conducted in April, 1993. Approximately one-third of all existing Network partnerships (N=8) were involved in this part of the evaluation study. Stratified random sampling was used in selecting teams. Semi-structured telephone interviews, lasting approximately 30 minutes each, were conducted by the project evaluator. Questions focused on the nature of their partnering relationship and corresponding changes in instructional practices.

III. Results

Findings

- The Partnership Program was a positive experience for teachers, business persons, and students during the 1992-93 school year.
- Most partnerships were described as "in the early stages," and met two to three times during the 1992-93 school year.
- The benefits, as noted by partners, exceeded the challenges presented by the partnership.
- All partnerships reported completing, at a minimum, most of the activities contained in their action plans; half reported completing all activities.
- Action plans were viewed as beneficial on a number of levels, as were the Science & Mathematics Network's efforts to facilitate instructional planning endeavors.
- Two major challenges to the partnership emerged: scheduling and partnership

maintenance issues.

- Two other less frequently mentioned issues were raised: (1) instructional follow-up by the business partner and (2) internal communications.
- Finally, partnerships identified essential "key ingredients" for the successful partnership:
  (1) the establishment of mutual expectations and common goals and a commitment to follow-through,
  (2) the opportunity to develop mutual understandings prior to making a year-long commitment,
  (3) continued external support from all levels of school administration and business management,
  (4) open communication, patience, and flexibility from partners, and
  (5) public promotion of the partnership as a way of garnering community acceptance and support.

Options Suggested

- **Partnership success will require flexibility from individuals at all levels.** Schools and businesses must be alerted to this need.

  As noted by partners, a key ingredient to partnership success is flexibility. This has been discussed primarily in terms of the flexibility partners must have in order to accommodate often-changing schedules. This is also an issue to which school administrators and business managers must be alerted.

  In order to sustain enthusiasm and motivation in partnership activities, school administrators and business mangers need to provide release time to teachers/business persons for planning and implementing partnership activities. Businesses and schools must seek creative ways in which they can accommodate partnership processes.

- **Long-term partnerships must be reinforced.** Schools, businesses, and the Science & Mathematics Network should continuously seek ways to recognize and publicly support partnership activities.

  Emphasizing its importance, partners noted various ways in which the partnerships have been externally supported, and the extent to which this support has contributed to their own enthusiasm and motivation. For some, the support was financial, but for most, it came in the much-appreciated form of public recognition. Examples of recognition ranged from a "pat on the back," to school assemblies with the District Superintendent and Business CEO as guest, to published articles (with photos) of partnership activities in the local newspaper.

  It is essential that these types of recognition continue to take place, and other mechanisms are sought.

- **Provisions must be made to facilitate communication among partnerships.** This means that teachers must have greater access to the means for communication than they presently do. If their professional associations extend outside of the classroom and school they must be able to communicate freely with these individuals, particularly if their association greatly influences their ability to carry out their assigned classroom responsibilities. Suggestions for providing FAX machines in classrooms were offered.

- **The Science & Mathematics Network should continue (and possibly expand) the Summer Institute.** Partners' comments were very positive about the Summer Institute, which was viewed as an opportunity to (1) meet with partners and plan activities for the coming year and (2) share experiences/successes with other partnerships. Some indicated that they would not have been able to find the time for planning if it weren't for the structured time provided by the Network during the Summer Institute. Also, for many the Institute was "uplifting" and motivational. This was even noted by a teacher whose partnership never solidified. It was because of the enthusiasm that she wanted to continue seeking a partner.

IV. Evaluator

Dr. Carol Cullen conducted the evaluation activities and authored the report. At the time of the study, she was an evaluation consultant at the National Center for Science Teaching and Learning. She is currently serving as the lead evaluator for the Eisenhower National Clearinghouse, assessing their effectiveness for the US Department of Education.

1993-95 Evaluation

I. Purpose

The Science & Mathematics Network commissioned this evaluation to develop an in-depth understanding of the nature and dynamics of Network-supported partnerships. The evaluation study's goals were to:

1. develop an in-depth understanding of the purposes, functioning, and interrelationships of participants in partnerships;
2. explore the impact of partnerships on teaching and learning; and
3. assess the role of the Science & Mathematics Network in facilitating partnerships.

II. Methodology

This evaluation consisted of partnership case studies in which partnership participants were interviewed and observed regarding their partnering efforts. The three partnerships selected for in-depth study were in separate schools and districts and each had distinct characteristics. For each partnership, interviews were conducted with the teacher, business partner, students, principal, and partnership liaison at the partner's firm (if applicable). Focused observation of teaching and learning behaviors of teachers, business partners, and students were also conducted during science instruction.

III. Results

Findings

- **Teachers, science partners, and students expressed a high level of interest and enthusiasm for their partnerships.** All of the teachers exhibited a strong commitment to their partnerships and expressed the belief that collaboration with science and math partners had become a vital part of their instructional program. Teachers also maintained that students were more interested in science and that their science learning had been enhanced in breadth and depth. Similarly, partners were highly committed to their partnerships and expressed a keen interest in continuing their partnering efforts. Finally, students indicated that science had become more interesting as a result of their partnering with a science and math professional.

- **School personnel believe that the science and math partner contributes a sense of relevance to the classroom and enriches the curriculum by their scientific perspective and expertise.** Teachers reported that they have been most significantly influenced by their partner's "ways of thinking" about everyday phenomena. Therefore, in practice, science and math partners brought their

culture into the classroom and stimulated teachers by the way they look at the world and the way in which they apply scientific principles to everyday experience.

Teachers and students expressed the idea that the influence of their partners adds a degree of authenticity to the study of science and mathematics. In the same vein, teachers maintain that students have learned to see scientists as "real people" and consequently believe that they too can become scientists.

- **Partnerships varied in the nature of their working relationships.** Interviews and observations indicated that, in general, participants seemed to know each other well and have a high regard for one another. In addition, they expressed a strong commitment to their partnerships shown by their expenditure of time and a desire to sustain their partnering initiatives.

  However, partnerships varied in the degree to which they shared common goals and actually worked together on an equal basis. Interviews with participants and observations of the interaction between teachers and science partners indicated that in the formative stages of a partnership, teachers and their partners assume distinct roles in which science and math partners act as an expert teacher and the classroom teacher serves in a supportive role. As partnerships develop, the participants begin to work together more interactively - with a greater degree of parity in their roles - in an effort to implement shared goals.

- **While the short-term effectiveness of the partnerships (on student learning) was based on the relationship between the teacher and science professional, the long-term stability of the partnerships was dependent on the level of organizational support.** Individual teachers and business partners tend to form strong alliances characterized by friendship, mutual respect, and commitment to the partnership. These alliances seem to be the "mortar" of the partnering efforts. Institutional support for partnering efforts does not seem to be a highly important factor in determining the strength of a partnership between teachers and science professionals. However, partnerships that do not have strong institutional support were viewed as tenuous since their sustainability is dependent on the initiative of teachers and their partners.

- **The instructional approaches observed in the partnership ranged from step-by-step discovery to more open-ended inquiry.** Teachers generally maintain that their thinking and instructional approach has been influenced by their partnering with a science professional. They report developing a better understanding of science concepts and using more "hands-on" science activities with their students. Most of the teachers in this study did use "hands-on" techniques but with a step-by-step instructional approach in which they posed questions or problems and led their students to discover solutions. While some lessons or aspects of science lessons were more open-ended inquiry, much of the instruction described by participants and observed in the study tended to take the

active, yet prescriptive approach described above.

- **Participants value The Science and Mathematics Network as an essential agent in linking people who are interested in partnering and in nurturing the development of partnerships.** The most impacting services of the Science and Mathematics Network have been:
  (1) to link or match teachers and business professionals together in partnerships;
  (2) to conduct partnering institutes in order to train teachers and their partners in the dynamics of partnering and hands-on science and mathematics instruction; and
  (3) to develop an expanding "network" of schools and business that are interested in effecting change in science and mathematics teaching and learning.

- **The impact that a partnership has on science and math instruction may be dependent on a number of factors. Among these are:**
  (1) the quality/depth of relationship between partners,
  (2) the degree of collaboration at all levels of the partnership,
  (3) the establishment of clear goals that reflect school reform initiatives,
  (4) administrative support,
  (5) frequency of communication,
  (6) degree of parity among participants in a partnership,
  (7) agreement of beliefs about partnering between participants,
  (8) the business partner's ability to relate to children.

Opportunities

- **Two important areas of opportunity for the Network emerge from this study:**

  (1) to provide additional assistance in establishing organizational linkages and structures between schools and business in order to solidify the long-term presence of partnerships; and
  (2) the Science & Mathematics Network should extend its efforts in monitoring and helping develop science and mathematics instruction in Network-sponsored partnerships.

IV. Evaluator

Donald Williams, Ph.D., conducted the evaluation activities and authored the report. Williams is an Assistant Professor in the College of Education at The Ohio State University Columbus campus.

1996 EVALUATION

"You really helped me be a lot more interested in science. Now math and science are two subjects I really look forward to. Math is my favorite subject in school now because of the fun activities and having you work with me."

(Julie Kindinger, student, Linden Park Elementary)

OVERVIEW

This evaluation study was designed to gauge the impact of reform-based partnerships on students -- their learning, their attitudes, and the future courses and careers they choose. To obtain the most accurate picture, a variety of perspectives were investigated -- test scores, teacher opinions through interviews, student opinions through a focus group, and the courses students chose to take in high school. The study compared students from a partnership school to other students from similar schools, and compared students from the partnership school who had varying years of exposure to the partnership.

While this is just the first year of the study, these early results show a definite trend emerging that indicates the impact of the partnership on various facets of students' learning, attitudes, and choices. As students who experienced the partnership in elementary school move through high school and into college, the patterns and trends in the data will be more clearly indicated. This study has established a strong process and an excellent set of baseline data to allow the study to continue and yield more results in future years.

GOALS OF THE EVALUATION

The study focused on three key areas to examine the impact of the partnership -- student achievement, student interest and confidence in science and mathematics, and course and career choices. The following questions reflect two ways the students from the partnership school were compared:

1) Current and past partnership school students compared to students from similar schools.
2) Partnership school students compared to other students from the same school who had differing numbers of years of exposure to the partnership.

Student Achievement

Is student achievement in math and science higher in the partnership school than in other schools?

Do students with more years of the partnering experience score higher than students with less years of exposure to the partnership?

Student Interest and Confidence in Science and Math

Do partnership school students display more interest and confidence in science and math than students from other schools?

What aspects of the partnering experience had the most impact on students?

Course and Career Choices

Do a higher percentage of students from the partnership school take enriched or honors level math and science courses in high school than students from other schools?

Do students from the partnership school take more years of mathematics and science in high school than other students?

Do students with more years of partnering experience take more high school math and science honors courses than students with fewer years of exposure to the partnership?

Do students with more years of partnering experience take more years of math and science courses in high school than students with fewer years of exposure to the partnership?

EVALUATION DESIGN

Description of the Partnership Studied

In describing the evaluation methodology, it is helpful to have an understanding of the kind of school-business partnering advocated and support by the Science & Mathematics Network of Central Ohio: reform-based partnering. In reform-based partnerships, teachers and business professionals from science, mathematics and technology backgrounds form collaborative partner teams. Each team works to blend the teacher's curricula in science and/or mathematics with the business person's expertise in these areas. To achieve this blending, partners develop partnership goals, overarching outcomes that define what students will know and/or be able to do as a result of the partnership experience. Then, the partners work to develop hands-on activities which support the goals and which help students build connections between textbook content and the real world. Partners work together in the classroom about once a month, on average.

While reform-based partnerships focus on hands-on experiences in science, mathematics and technology, reform-based partnerships go beyond compiling good projects to affecting instruction, student learning and teacher empowerment. Successful reform-based partnerships tend to:

- be innovative and pioneering
- involve hands-on, classroom-focused, and age-appropriate activities;
- grow out of long-term collaborative relationships
- assess both student learning and the partnership process
- bring partners together at least once a month, or more
- involve multi-level support from supervisors and colleagues.

The evaluation study focused on an elementary school in which each teacher has been involved in a Network-assisted, collaborative partnership with a scientist. These partnerships have existed since the school's opening five years ago. All of the partners teams have attended a Network Partnering Institute, a two-day workshop during which partners develop their goals, plan activities and learn how to create a successful partnership. They have also received ongoing support from the Network, in the form of a follow-up session to the Institute they attended, frequent communications from Network staff about new science, mathematics, technology and partnering resources and opportunities to learn about new activity ideas and effective instructional strategies. All teachers and scientists involved in the partnership gather at least once a year to discuss their experiences and to plan for the upcoming year. The elementary school is in a suburban school district and has one class per grade level, grades 1 - 5. The average class size is about 25 students.

Comparing the Partnership School to Other Selected Schools

Data were gathered for students who currently attend or are alumni of four schools:

The partnership school (A math/science magnet school with one class per grade level. Each class has a partnership)

Comparison School A (A school similar in type - a magnet school [not math/science] - and size to the partnership school)

Comparison School B (A second school similar in type - a magnet school [not math/ science], somewhat larger in size in comparison to the partnership school)

Comparison School C (A randomly selected non-magnet school with the normal elementary school size of several classes per grade level)

All schools are in the same district. Students are selected to attend the magnet schools based on a lottery system and not on academic achievement. The partnership school was compared primarily to other magnet schools, on the advice of district representatives who indicated that magnet-school-to-magnet-school yielded the most accurate comparisons, since a high level of parental involvement is the strong common factor in all magnet schools regardless of the academic discipline on which the school focused. One non-magnet school was also included to allow a comparison to the more general school population. (See Figure 1, before the Appendices, for a Summary)

Comparing Partnership School Students with Varying Years of Exposure to the Partnership

The partnership school has had a Network-assisted partnership at every grade level since 1992. Over time, this has created a situation where as each successive class

graduates, those students have increasing years of experience in a partnership. To track the influence of more years of partnering on course choices and proficiency test pass rate, data was examined and compared using the first class to graduate and then tracking changes in choices and pass rate in successive classes who had experienced more years of partnering. (See Figure 2 below for a detailed comparison)

Year graduated from elementary school	**1992**	**1993**	**1994**	**1995**	**1996**	**1997 Still in Elementary**
Grade level ENTERING in 1996/97 school year	10th	9th	8th	7th	6th	5th
Grade level during study	9th	8th	7th	6th	5th	4th
Years of exposure to partnership	1	2	3	4	5	4
Class of	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**

FIGURE 2

Methodology Related to Each of the Four Evaluation Components

It is very difficult to collect evidence in such a way that allows conclusions to be drawn regarding the direct cause and effect of the partnering process on student outcomes. The use of multiple samples, techniques, and data sources has been employed to portray a holistic view of the program. This evaluation design has focused on a number of components to construct this multifaceted view of the impact of partnerships.

- Comparison of proficiency test scores between partnership and non-partnership schools.
- Interviews with middle school teachers to reflect the attitude and achievement of students from the partnership school versus non-partnership schools.
- Analysis of student choices of mathematics and science courses to look for choices of higher level courses.
- Gathering of information from a focus group of high-achieving students who attended the partnership school to identify key factors that stimulated their interest and achievement in science and mathematics.

Comparison of Proficiency Test Scores

During the 1995-96 school year proficiency tests were given at the 4th, 6th and 8th/9th grade in both mathematics and science. The common piece of information available for all three of the grade levels and all schools is the percentage of students that passed the test (the pass rate). That percentage was the focus of the data gathered. The data was gathered for each individual student, and class percentages were completed for fourth, sixth, and ninth grade tests. The fourth graders were still in their respective school, while the sixth and ninth graders were tracked and compared based on their elementary school and the year they "graduated" from elementary school.

Difficulty was encountered in the tracking of students after they "graduated" from magnet schools to middle school because they return to their neighborhood middle schools (3 possible schools) and then those three middle school populations are assigned to two high schools. An additional challenge was that the district kept no historical records of where students had attended school in prior years. To determine which students "graduated" from the various elementary schools included in the study, class lists (in some cases 4 years old) had to be obtained from individual teachers. In one case, the lists were not obtained in time for those students to be included in the study. An additional factor to note for this and future studies is that when there is only one class per magnet school, added weight is placed on each of those student's scores.

Interviews With Middle School Teachers

Nine science and/or math middle school teachers from the same district as the partnership school were interviewed. The teachers were first asked a series of questions regarding their students in general. They were then shown a list of students from the partnership school who had been in the sixth, seventh, and eighth grade the previous school year. After identifying the students from those lists that they had in class, they were asked questions specifically about these students as compared to non-partnership school students. These teachers proved to be well-equipped to identify the skills that students carry from the partnership and how they applied them to their new experiences in middle school. The interview questions are attached in Appendix B. The middle school teachers had varying numbers of students from the partnership school, so their comments reflect different levels of exposure to the students.

High School Courses Taken by Students from the Partnership School and Students from the Comparison Schools

Class schedules for students from the partnership school and the comparison schools were examined to determine the level and number of math and science courses taken by each student. This data was then compiled by school and year.

Ninth grade is the first year that course choices can be made. Consequently, data is only available for two groups of students, the classes of 1999 and 2000. Comparing successive classes of students from the partnership school allows these students not only to be compared to students from other schools, but also to be compared to other classes of students from the partnership school. (See Figure 2) This will allow the impact of increasing numbers of years of exposure to the partnership to be evaluated.

Most importantly, a procedure has now been established for gathering the data for this component. Student course choices can now be tracked throughout the four years of high school, with more choices available as students reach the junior and senior level.

Difficulties encountered with this component included the fact that as students progress through higher grade levels, some move away from the district or attend private schools. When this happens, course selections for those students can no longer be tracked. Additionally, with respect to science, school district representatives indicate that both academic and scientific science courses are equally challenging, though in different ways. Academic courses provide greater exposure to applications of concepts and skills while scientific courses focus on traditional content.

Focus Group of Excellent Students from the Partnership School

A group of six students was identified who had "graduated" from the partnership school and whom middle school teachers had indicated were excellent math and science students. In a 45-minute session, they were asked questions to gather information on key factors that stimulated their interest and achievement in math and science and their reactions to the partnerships and the partners themselves. The session was videotaped and transcribed. The students were of varying grade levels (from 7th-10th).

A difficulty encountered centered on asking middle school and early high school students to reflect on what has influenced their success in math and science. This proved to be a challenging task for them. As students become older, more informative data may emerge.

MAJOR FINDINGS AND RESULTS

"The Battelle scientists have really made a difference in my career choice."

(Sarah Lemoncelli, 3rd grade student, Stiles Elementary)

MAJOR FINDINGS AND RESULTS

Overview

The following sections summarize the results from each of the evaluation components studied. Each component yields conclusions on one or more of the three key areas of this study, the impact of partnerships on:

Student Achievement
Student Interest and Confidence in Science and Math
Course and Career Choices

When taken as an aggregate, the data does seem to indicate an emerging trend that partnerships may very well be influencing student achievement, interest, and confidence. Influence on course and career selection is not evident, perhaps because students from the partnership school are just beginning high school -- the first time when course choices can be made. The continuation of this study in upcoming years will not only allow for the monitoring of current trends as they strengthen or weaken, but also allow new trends to be identified as students move through high school and into college and careers.

Comparison of Proficiency Test Scores

Conclusions:

- More 4th grade students at the partnership school passed the proficiency test than students at the comparison schools. (see Appendix A)

- When comparing performance of partnership school students and alumni on the 4th, 6th, and 9th grade proficiency test, the 4th graders (with the most years (4) exposure to a partnering experience) had the highest passage rate.

Discussion:

While the proficiency test is only one measure of student achievement, these early results seem to indicate that involvement in the partnership school is leading to a high pass rate. Not only did current fourth graders in the partnership school pass at a higher rate than their peers at non-partnership schools, but students with more years of experience with the partnership passes at a rate higher than alumni with fewer years of partnering experience. Although the proficiency tests taken by the 4th, 6th, and 9th grades are, of course, different, because this is the first year for the 4th and 6th grade test, no year-to-year comparison can be made. In the future it will be possible to compare the pass rates of successive classes on the same grade level test.

Interviews With Middle School Teachers

Conclusions:

- The majority of teachers interviewed said that the partnership school students have very high interest levels and are very motivated.
- Five of the nine teachers interviewed said that their students from the partnership school have high levels of scientific/mathematical knowledge.
- The majority of teachers that were interviewed stated that the partnership school students were able to effectively communicate their knowledge and apply it to other content areas.
- Partnership school alumni were found to have related their partnership experiences to current topics being studied.
- The majority of teachers interviewed noted that students that they had from the partnership school had very high levels of confidence and were very comfortable studying and learning science and math.
- Teachers indicated that the partnership school students are willing to take risks in problem solving while many others are not.

Discussion:

The most prominent strand in the interview results relates to partnership school students' motivation, interest in, and confidence related to science and mathematics. Although the teachers interviewed also indicated that students had high levels of knowledge, the motivation, interest, and confidence may be the overarching life-long attitudes that will lead students to future success in courses and careers. The impact of business partners in the formation of these attitudes also emerges in comments from the student focus group.

High School Courses Taken by Students from the Partnership School Compared to Students from Other Schools

Conclusions:

- Partnership school students from the classes of 1999 and 2000 (with only one or two years of exposure to the partnership) did not select more high level courses than students from the comparison schools.

Discussion:

The lack of a pattern of higher-level course selection by partnership school students seems very logical, as they were only in the partnership school for 1 or 2 years. (See Figure 2.) As successive classes of students with more partnership exposure reach high school, comparisons can be made among the various classes. Additionally, it is too early to tell if partnership school students take more science and mathematics courses than do their peers. Two science and mathematics course are taken by most of the district's students. If students are only planning to take 2 courses, they are often taken during the freshman and sophomore years. Because this data only includes freshman and sophomores, the number of students taking courses beyond the minimum requirements will not emerge clearly until the students reach the junior and senior level.

Focus Group of Excellent Students from the Partnership School

Conclusions:

- The students remembered and enjoyed their activities with their partners.
- Selected quotes from the Focus Group transcription:

Focus Group Leader: Thinking about your experience in elementary school and the partnerships, what's the one thing that really sticks out in your mind about either the things that you did with your partners or your partner as a person?

Amber: In second and fourth grades, we had the same partner, Dr. Schultz. He keeps track of people. Like he sent me a postcard in sixth grade when he saw my name in the newspaper.

Keegan: I liked our fifth grade scientist because he was really easy to talk to and my sister's in fourth grade now and she receives postcards from Dr. Schultz about every two months.

Focus Group Leader: Before the scientist came in and you heard that you were going to have a scientist in your classroom, what do you remember you thought?

Tyler: It was really exciting, cause it was a new person in the classroom and we could just be with them and talk with them see what he does.

Focus Group Leader: Myself personally, when I think of a scientist, I think of this guy with crazy white hair like Einstein, things like that. Did you ever think of it that way? (Everyone nods) Is that what your partner looked like?

Liam: Also in 2nd grade, I though scientists were people who sat down, put strange things together and see what they did, and that's not what it is.

Keegan: I thought it was the mad scientist type with all these bottles and chemistry.

Focus Group Leader: What did you learn from working with the scientists? Is that what they do?

Michelle: They're cool. Cause they would put scientific things into our words so that we could understand and when we did things like the gum drops, he color-coded the gum drops and that helped.

Keegan: I liked the marshmallows when we dipped them in liquid nitrogen and then they got all hard and that was one way they made science fun.

Focus Group Leader: And they found ways to make science more fun for you? Do you think that you enjoy science more now because of that? (Keegan smiles and says yeah.)

Amber: When I went to the magnet school, I wasn't really happy about that because I didn't really like math and science, but I really like it now.

Focus Group Leader: When you think back on your time in elementary school, what do you think you got out of having a partner the most? How do you think they helped you the most?

Michelle: With the scientists at my school, if we had a question, they helped us, it wasn't as if they made us feel dumb. When you get to middle school, you have the courage to ask questions and you find out it's the same, no one will make fun of you. But some of my friends, they won't ask questions in class cause they're afraid someone will say something. But through our scientists, if you do and ask a question, they'll answer and you don't feel dumb.

Focus Group Leader: Do you think that the scientists should keep coming to the school?

Keegan: Definitely.

Focus Group Leader: Why?

Keegan: It just helps.

Liam: It's better than talking to a teacher who does every subject in elementary school and the scientist does just science, period and they know more about it.

Amber: I was glad in third grade when we had a woman scientist and that showed that women can be scientists.

Discussion:

The comments made by students in the focus group strongly indicate that the partners and the activities they did were memorable and stimulated interest and excitement about science. The comment by Michelle relaying the comfortable atmosphere established by the partner, where all questions were encouraged, matches the report by middle school teachers that students from the partnership school were more willing to take risks in problem solving than were other students. The breaking down of job and gender stereotypes because of interaction with partners also emerged as a prominent aspect of the focus group discussion.

REFLECTIONS AND SUGGESTIONS

Reflections on the Results and Methodology

The use of a multifaceted approach provided an appropriate amount of quantitative and qualitative data. When taken as an aggregate, the data does seem to indicate an emerging trend that partnering may well be influencing student achievement and attitudes. This preliminary data suggests that being exposed to a partnership over a longer period of time (i.e. an entire elementary school career) is especially effective.

As students who experienced the partnership in elementary school move through high school and into college, the patterns and trends in the data will be more clearly indicated.

Focusing on only one district in this initial year was very helpful. The many procedural and logistics questions could be worked through allowing criteria and strategies to be developed which can now be applied to other districts.

To identify a clear trend of the impact of partnership schools on proficiency test scores and course choices, these measures need to be tracked over several years, as more students have a full 5 years of partnership experience. To accomplish this, the identification of students in each grade level and who "graduated" from magnet schools needs to occur each school year to yield complete data. With this mechanism now in place, the completeness and accuracy of the study in upcoming years will be improved.

This year's study has established an excellent set of baseline data that can easily be added to in order to clearly show patterns and trends over the next few years as students from the partnership school move into and through high school.

Suggested Additions for Next Year's Study

- Continue to build the data sets in the current district by adding each successive year of data as students mature.
- Begin a similar study of one or two other schools that have a partnership at each grade level.
- Begin to gather data on at least some study components from a partnership that includes only one grade level of a school.
- Incorporate at least one Columbus Public School into the study.
- Design a pilot study that uses direct contact with students to gather and track data related to several of the evaluation components.

Comparing The Partnership School With Other Schools

Partnership School
- Elementary school
- A math/science magnet school

Comparison School A
- Same district
- Elementary school
- Also a magnet - - not math/science
- Same level of parent involvement assumed
- Same size student population as partnership school

Comparison School B
- Same district
- Elementary school
- Also a magnet - - not math/science
- Same level of parent involvement assumed
- Larger student population than partnership school

Comparison School C
- Same district
- A non-Magnet school
- Less parent involvement assumed
- Same size student population as School B

FIGURE 1

APPENDIX A

PROFICIENCY TEST DATA

School board led on a review of '95-96 overall test results

By ALAN FROMAN
ThisWeek Staff Writer

Director of Planning and Research Ray Bertelsen presented Westerville school board members with an overview of 1995-96 test results in local schools.

Bertelsen reviewed with board members what he considered the most interesting parts of the 43-page report he distributed to them.

The norm for the second-grade reading test in the 1995-96 Iowa Test/Cognitive Testing was 2.6, Bertelsen said.

Almost every Westerville elementary school equaled or bettered the projected score the district predicted for each school. Only Hanby Elementary scored lower than its projected score, he said.

In the second-grade language test, seven of the 14 elementaries met or bettered the projected scores. Overall, the district's actual scores about equaled what had been projected.

In the second-grade mathematics test, every school but Hanby equaled or bettered the district's projected score. Overall, the district's average score was well above what had been projected.

Bertelsen also reviewed the district's results in the fourth- and sixth-grade proficiency tests. This was the second year the fourth-grade tests were given and the first for the sixth-grade tests, which cover writing, reading, math, citizenship and science.

Overall, 84 percent of the district's fourth-graders passed the writing test. Eighty-nine percent passed reading, 81 percent passed math, 92 percent passed citizenship and 75 percent passed science.

A higher percentage of Westerville fourth-graders passed each component of the test than the state average. Sixty-three percent of the students passed all five components, compared to 50 percent statewide.

At Longfellow Magnet school, 100 percent of the students passed the writing, reading, math and citizenship tests. Ninety-six percent of Longfellow students passed the science test.

How are they doing?

The Ohio Ninth-Grade Proficiency Test results were released by the Ohio Department of Education. This chart represents the percentage of ninth-graders in area school districts who passed the test administered in March 1995.

DISTRICT	WRITING	READING	MATH	CITIZENSHIP	SCIENCE
Bexley	94%	98%	88%	91%	88%
Canal Winchester	88%	97%	82%	94%	88%
Columbus	77%	80%	45%	70%	78%
Dublin	88%	94%	82%	88%	72%
Gahanna-Jefferson	88%	94%	82%	90%	67%
Grandview Heights	93%	98%	86%	94%	80%
Groveport Madison	75%	87%	62%	85%	41%
Hilliard	92%	95%	86%	90%	80%
Reynoldsburg	92%	92%	73%	90%	58%
South-Western	82%	89%	67%	80%	42%
Westerville	92%	94%	81%	91%	85%
Whitehall	91%	92%	64%	88%	36%

Source: Ohio Department of Education

Charts by Carl Henderson/*ThisWeek*

In the three middle schools, 72 percent of the sixth-graders passed the writing test. Eighty-six percent passed the reading test, 64 percent the math test, 75 percent passed citizenship and 58 percent passed science. Westerville's percentage was higher in each category than the state average. Forty-three percent of Westerville sixth-graders passed all five components, compared with 28 percent statewide.

Bertelsen said Westerville tied for fourth with Reynoldsburg among Franklin County school districts with 92 percent of ninth grade students having passed the writing portion of the ninth grade proficiency test after three attempts. In Westerville, students take the test for the first time in the spring of their eighth-grade year.

Only Gahanna, Bexley, Upper Arlington and Grandview Heights finished above Westerville.

After their first three attempts, 94 percent of Westerville freshmen had passed the reading portion of the ninth grade proficiency test, Bertelsen said. Eighty-one percent had passed the mathematics test, 91 percent had passed the citizenship test and 65 percent had passed the science test.

The science component was a new addition to the test this year, Bertelsen said.

In the 12th-grade proficiency test, passage of which is not needed for graduation, Westerville ranked fourth in the county with 75 percent of students passing the science portion of the test. Grandview Heights, Bexley and Upper Arlington ranked above Westerville. This year was the first time the science test was given.

Westerville also ranked fourth in the county with 60 percent of its seniors passing all five parts of the 12th grade test. Grandview, Bexley and Upper Arlington again finished above Westerville.

Nineteen of Westerville's seniors, representing 3 percent of the Class of 1996, passed all five tests with honors.

Grading the schools

The following charts list the percentage of fourth- and sixth-graders in the Westerville School District who passed the Ohio fourth- and sixth-grade proficiency tests administered in March. State and district percentages are also listed.

GRADE 4

School	Writing	Reading	Math	Citizenship	Science	All five
Annenurst	89%	94%	89%	97%	89%	75%
Central College	88%	88%	88%	96%	81%	77%
Cherrington	87%	87%	69%	98%	71%	49%
Emerson	82%	96%	95%	96%	93%	75%
Hanby	75%	70%	46%	58%	29%	26%
Hawthorne	72%	78%	68%	82%	56%	42%
Huber Ridge	86%	91%	81%	93%	63%	56%
Longfellow	100%	100%	100%	100%	96%	96%
Mark Twain	90%	96%	94%	96%	95%	87%
McVay	94%	95%	89%	97%	87%	79%
Pointview	67%	74%	65%	81%	54%	41%
Robert Frost	89%	96%	92%	96%	77%	72%
Whittier	78%	90%	82%	91%	82%	63%
Wilder	88%	87%	80%	93%	78%	60%
District	*84%*	*89%*	*81%*	*92%*	*75%*	*63%*
State	**79%**	**82%**	**73%**	**85%**	**59%**	**50%**

GRADE 6

School	Writing	Reading	Math	Citizenship	Science	All five
Blendon	75%	88%	65%	78%	65%	46%
Heritage	77%	85%	62%	76%	54%	43%
Walnut Springs	65%	86%	64%	73%	57%	42%
District	*72%*	*86%*	*64%*	*75%*	*58%*	*43%*
State	**64%**	**74%**	**45%**	**62%**	**42%**	**28%**

Source: Westerville School District

Linda -

I thought you might want this for your files. There are some pretty impressive numbers @ Longfellow! Chris and I may have to get Jacob in the lottery to attend there!

Mark

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SUBSCALE FREQUENCY DISTRIBUTION (sample report on following page)

Features of the Subscale Frequency Distribution

The second part of the Frequency Distribution provides subscale information Within each test area, the subscales are divided into three categories. The middle category is the band or range of raw scores corresponding to the predicted scores for the minimally proficient student. The categories above and below the middle category represent the upper and lower ranges of raw scores possible for the subscale.

This information can be very helpful in determining how well fourth-grade students in this school are prepared for the fifth grade. By following the steps below, educators can use the Subscale Frequency Distribution to review curriculum and instruction in the fourth grade.

This report:

- Provides, for each test area, the number of students (or frequency) and percentage of students in each of three categories with a comparison to the statewide cumulative percentage. The middle category is the range of raw scores corresponding to the predicted scores for minimally proficient students The categories above and below the middle category represent the upper and lower ranges of raw scores possible in parentheses for the subgroup.
- Provides cumulative number and percentage of students in the group who achieved at or above each performance level, and the cumulative percentage of students statewide for comparison.
- Enables schools and districts to evaluate overall performance for each subscale within the test areas.
- Provides the number and percentage of students who achieved each of the performance levels in each of the four analytic subscales on the Writing test These numbers do not include those students who met the holistic performance standard or did not have two valid writing samples.

Group Performance

On the following page is the Subscale Frequency Distribution. The following observations can be made from this report.

- A total of 35 students attempted the Reading test. This can be determined by looking at the column titled "Cum. Freq."
- On the Fiction: Constructs Meaning subscale, 8 students, or 23 percent of this group, demonstrated performance lower than the minimally proficient standard.
- On this same subscale, 46 percent of the students performed at the minimally proficient standard.
- On this same subscale, 31 percent of the students performed higher than those who scored at the minimally proficient standard.

Ohio Fourth-grade Proficiency Tests

STUDENT ROSTER

IRN: 045047-021345

COUNTY: FRANKLIN COUNTY SCHOOL: LONGFELLOW WE DATE TESTED: MARCH 1996
DISTRICT: WESTERVILLE C RUN DATE: 5/25/96

SUMMARY

Subscale	W (Band) S
WRITING	
TOTAL WITH VALID SCORE:	26
MEAN SCORE:	6.6
NUMBER AT OR ABOVE 7.0:	14
PERCENT AT OR ABOVE 7.0:	54%
NUMBER AT OR ABOVE 4.0:	26
PERCENT AT OR ABOVE 4.0:	100%
NUMBER BELOW 4.0:	0
PERCENT BELOW 4.0:	0%

Subscale	W (Band) S
READING	
NUMBER OF STUDENTS:	26
MEAN SCALE SCORE:	228.2
NUMBER AT OR ABOVE 250:	2
PERCENT AT OR ABOVE 250:	8%
NUMBER AT OR ABOVE 200:	26
PERCENT AT OR ABOVE 200:	100%
NUMBER BELOW 200:	0
PERCENT BELOW 200:	0%

Subscale	W (Band) S
MATHEMATICS	
NUMBER OF STUDENTS:	26
MEAN SCALE SCORE:	237.8
NUMBER AT OR ABOVE 250:	7
PERCENT AT OR ABOVE 250:	27%
NUMBER AT OR ABOVE 200:	26
PERCENT AT OR ABOVE 200:	100%
NUMBER BELOW 200:	0
PERCENT BELOW 200:	0%

Subscale	W (Band) S
CITIZENSHIP	
NUMBER OF STUDENTS:	26
MEAN SCALE SCORE:	241.3
NUMBER AT OR ABOVE 250:	5
PERCENT AT OR ABOVE 250:	19%
NUMBER AT OR ABOVE 200:	26
PERCENT AT OR ABOVE 200:	100%
NUMBER BELOW 200:	0
PERCENT BELOW 200:	0%

Subscale	W (Band) S
SCIENCE	
NUMBER OF STUDENTS:	26
MEAN SCALE SCORE:	236.5
NUMBER AT OR ABOVE 250:	8
PERCENT AT OR ABOVE 250:	31%
NUMBER AT OR ABOVE 200:	25
PERCENT AT OR ABOVE 200:	96%
NUMBER BELOW 200:	1
PERCENT BELOW 200:	4%

Subscale	W (Band) S
TOTAL TEST	
NUMBER OF STUDENTS:	26
NUMBER AT OR ABOVE 250:	1
PERCENT AT OR ABOVE 250:	4%

A Scaled Score (SS) of 200 is the proficient score and a Scaled Score of 250 is the advanced proficient score (AP) for Reading, Mathematics, Citizenship and Science.
A score of 4 is the proficient score and a score of 7 is the advanced proficient score (AP) for Writing.
The Writing score is the sum of scores for two writing tests.

(Band) = Performance typical of students at the standard
W = Weakness
S = Strength
DNA = Did not attempt
INV = Invalid
F = Fiction NF = Nonfiction

Writing Condition Codes
A = Blank
B = Refusal
C = Illegible/Foreign language
D = Insufficient to score
E = Off topic/Off task
F = Erased or crossed out
G = Plagiarism

CTB/ID: 861484006184001 04 00280 030765

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Ohio Fourth-grade Proficiency Tests

FREQUENCY DISTRIBUTION
Subscale Frequencies

IRN: 045047-021345

SCHOOL: LONGFELLOW WE
DISTRICT: WESTERVILLE C

DATE TESTED: MARCH 1996
RUN DATE: 5/25/96

Reading	(Above) (Band) (Below)	Freq.	Cum. Freq.	Percent	Cum. %	State %
FICTION CONSTRUCTS MEANING	(5-9)	23	26	88	100	100
	(3-4)	3	3	12	12	34
	(0-2)	0	0	0	0	10
FICTION EXTENDS MEANING	(12-17)	25	26	96	100	100
	(10-11)	1	1	4	4	30
	(0-9)	0	0	0	0	14
NONFICTION CONSTRUCTS MEANING	(4-5)	21	26	81	100	100
	(2-3)	4	5	15	19	58
	(0-1)	1	1	4	4	12
NONFICTION EXTENDS MEANING	(8-11)	21	26	81	100	100
	(6-7)	5	5	19	19	41
	(0-5)	0	0	0	0	13
Mathematics						
PATTERNS, RELATIONS & FUNCTIONS	(3-4)	22	26	85	100	100
	(1-2)	4	4	15	15	55
	(0-0)	0	0	0	0	7
PROBLEM SOLVING STRATEGIES	(4-7)	15	26	58	100	100
	(2-3)	9	11	35	43	66
	(0-1)	2	2	8	8	17
NUMBERS AND NUMBER RELATIONS	(7-9)	17	26	65	100	100
	(5-6)	8	9	31	35	62
	(0-4)	1	1	4	4	18
GEOMETRY	(5-7)	17	26	65	100	100
	(3-4)	6	9	23	35	53
	(0-2)	3	3	12	12	20
ALGEBRA	(4-4)	15	26	58	100	100
	(2-3)	11	11	42	42	66
	(0-1)	0	0	0	0	24
MEASUREMENT	(10-13)	24	26	92	100	100
	(8-9)	2	2	8	8	49
	(0-7)	0	0	0	0	23
ESTIMATION AND MENTAL COMPUTATION	(4-5)	14	26	54	100	100
	(2-3)	10	12	38	46	71
	(0-1)	2	2	8	8	22
DATA ANALYSIS AND PROBABILITY	(4-5)	25	26	96	100	100
	(2-3)	1	1	4	4	44
	(0-1)	0	0	0	0	13
LEVELS OF UNDERSTANDING CONCEPTUAL UNDERSTANDING	(16-24)	26	26	100	100	100
	(14-15)	0	0	0	0	41
	(0-13)	0	0	0	0	28
LEVELS OF UNDERSTANDING KNOWLEDGE AND SKILLS	(8-12)	22	26	85	100	100
	(6-7)	3	4	12	15	38
	(0-5)	1	1	4	4	14
LEVELS OF UNDERSTANDING APPLICATION & PROBLEM SOLVING	(9-18)	23	26	88	100	100
	(7-8)	2	3	8	12	47
	(0-6)	1	1	4	4	28

Citizenship	(Above) (Band) (Below)	Freq.	Cum. Freq.	Percent	Cum. %	State %
AMERICAN HERITAGE	(7-11)	25	26	96	100	100
	(5-6)	1	1	4	4	25
	(0-4)	0	0	0	0	8
PEOPLE IN SOCIETIES	(6-8)	21	26	81	100	100
	(4-5)	4	5	15	19	47
	(0-3)	1	1	4	4	12
WORLD INTERACTIONS	(5-5)	15	26	58	100	100
	(3-4)	11	11	42	42	53
	(0-2)	0	0	0	0	9
RESOURCE ALLOCATION	(6-9)	26	26	100	100	100
	(4-5)	0	0	0	0	23
	(0-3)	0	0	0	0	6
DEMOCRATIC PROCESSES	(6-9)	24	26	92	100	100
	(4-5)	2	2	8	8	38
	(0-3)	0	0	0	0	14
RIGHTS AND RESPONSIBILITIES	(9-12)	25	26	96	100	100
	(7-8)	1	1	4	4	27
	(0-6)	0	0	0	0	11
Science						
NATURE OF SCIENCE	(14-25)	23	26	88	100	100
	(12-13)	3	3	12	12	52
	(0-11)	0	0	0	0	37
PHYSICAL SCIENCE	(8-9)	16	26	62	100	100
	(4-5)	7	10	27	38	71
	(0-3)	3	3	12	12	32
EARTH AND SPACE SCIENCE	(7-11)	22	26	85	100	100
	(5-6)	3	4	12	16	59
	(0-4)	1	1	4	4	31
LIFE SCIENCE	(7-10)	18	26	69	100	100
	(5-6)	7	8	27	31	58
	(0-4)	1	1	4	4	25
LEVELS OF UNDERSTANDING ACQUIRING SCIENTIFIC KNOWLEDGE	(11-15)	20	26	77	100	100
	(9-10)	6	6	23	23	52
	(0-8)	0	0	0	0	29
LEVELS OF UNDERSTANDING PROCESSING SCIENTIFIC KNOWLEDGE	(11-19)	19	26	73	100	100
	(9-10)	5	7	19	27	60
	(0-8)	2	2	8	8	38
LEVELS OF UNDERSTANDING EXTENDING SCIENTIFIC KNOWLEDGE	(10-20)	23	26	88	100	100
	(8-9)	1	1	4	4	49
	(0-7)	0	0	0	0	33
Writing (Based on students Below the Standard)						

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EIGHTH AND NINTH GRADE PROFICIENCY DATA (COMBINED)

SCHOOLS USED:

Partnership School
School A
School C

TOTAL STUDENTS: 299

Partnership School: 54
School A: 92
School C: 29

TOTAL STUDENTS NOT PASSING SCIENCE PROFICIENCY:

Partnership School: 15%
School A: 7%
School C: 19%

SIXTH GRADE PROFICIENCY DATA

TOTAL STUDENTS NOT PASSING MATH:

Partnership School: 8%
School A: 10%
School C: 33%

TOTAL STUDENTS NOT PASSING SCIENCE:

Partnership School: 23%
School A: 23%
School C: 37%

FOURTH GRADE PROFICIENCY DATA

TOTAL STUDENTS NOT PASSING MATH:

Partnership School: 0%
School A: 12%
School B: 5%
School C: 6%

TOTAL STUDENTS NOT PASSING SCIENCE:

Partnership School: 4%
School A: 19%
School B: 7%
School C: 5%

APPENDIX B

MIDDLE SCHOOL TEACHER INTERVIEWS

Interview Questions

Interest Levels:

1) How would you describe your students' interest levels in Science/Math?

2) Do you notice any significant levels of diversity among your students' interest levels? If yes, to what do you believe this could be attributed?

3) Do the students from the Partnership School have a higher level of interest compared to your other students?

Knowledge:

1) How do you feel about the readiness skills of the students who arrive in your classroom?

2) Are these students prepared to delve into new areas, or is reteaching often necessary?

3) How do the Partnership School students compare to your other students in knowledge of the content areas?

4) Are most of your students capable of communicating their knowledge effectively? If yes, can you give any examples? If no, why do you believe this is true?

5) Do you feel that the Partnership School students are better capable of communicating their knowledge? Examples?

6) Do these students bring differing perspectives to classroom discussions? How do they compare to the other students?

Questioning:

1) Do the students who were involved in the partnership appear to think more scientifically? What leads you to believe this?

2) Are these students likely to ask questions about everyday phenomena? Do they do this more than students who were not involved in a partnership?

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3) How do these students react to differing explanations of experimentation? How do they respond to differing hypotheses?

4) Are these students open to differing opinions?

General:

1) In general, what differences do you see between the students from Partnership School and your other students?

2) Do these students take leadership roles in the classroom any more than others? Examples?

3) Do these students appear more comfortable in the area of science/math than others? Why do you believe this is true?

4) Do you feel that the partnership was beneficial to the students who participated? If so, in what ways do you feel that they have benefited?

5) Are there any outstanding characteristics of Partnership School students that you believe can be attributed to their involvement in the partnership? If so, what are they?

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Interview Responses
Mark Brady
Eighth Grade Science Teacher
Algonquin Middle School

July 10, 1996

GENERAL RESPONSES: Mr. Brady feels that the students' interest levels are fairly low. He believes this is because by this time in their academic career they have, for the most part, decided that they do not want a future in science, so they become uninterested. Mr. Brady feels that the majority of students have the necessary skills needed for his class, but there are still some that struggle with the necessary math skills. Most students, in his opinion, are able to effectively communicate their knowledge, but they may need to be guided through the process of explaining how they know something.

THE PARTNERSHIP SCHOOL STUDENTS: Mr. Brady had only one student from the Partnership School last year. This student had very good work skills and she was a good student. She earned an "A" in his class. She frequently contributed to class discussions and her responses were well thought out and typically correct. She had very good comprehension skills and she applied her knowledge well. She was also one of the very few students that could synthesize the information given and apply it to new situations. She seemed very comfortable in the science setting and she was highly capable. She did not come out as a leader, but when called upon to be a leader she met the task. Mr. Brady believes that the partnership program is very beneficial to the participating students. He feels that the biggest problem students have in science is making connections to the real world, and the partnership allows them to see this in action. He also feels that it is important for the students to see careers that use science. This may guide them towards a future career in science.

Interview Findings
Bill Dawson
Sixth Grade Math Teacher
Park Ridge Middle School

Interview date: July 1,1996
Phone Interview 1:00 p.m.

Mr. Dawson had only one Partnership School student in class this year, so it was very difficult for him to draw any conclusions regarding the partnership with such a limited pool.

In general Mr. Dawson feels that students' interest levels depend a great deal on their confidence levels. He feels that the more confident students appear more interested in the subject matter than those who may be more insecure in their knowledge of the subject.

Mr. Dawson feels that students in general need a better grasp of basic mathematical skills when they come to middle school.

The one Partnership School student that Mr. Dawson had in class is a very good problem solver. He is able to effectively communicate his knowledge of the problem solving strategies, but he has difficulty with the basic facts used to solve the problems. He is able to find the necessary information to solve the problems, but struggles to complete the problems correctly because he does not know the basic facts.

This student is a quiet student and is not very assertive in class. Because of his problem-solving skills, Mr. Dawson felt that he was more advanced than he actually was.

Interview Responses
Tim Bourghese
Science Teacher
Algonquin Middle School

Phone Interview
July 1,1996 1:30 P.M.

Mr. Bourghese has taught sixth, seventh, and eighth grades science at Algonquin for a number of years. He has had a good sampling of students who came from the Battelle-Partnership School partnership.

GENERAL QUESTIONS: Mr. Bourghese feels that the students at Algonquin have high interest levels. He believes that this results from the students freedom to choose the courses they take in seventh and eighth grades. He feels that some of the more "challenged" students are given more opportunities for success with this system and he feels that they are benefiting because of this. Mr. Bourghese believes that students' readiness skills have definitely improved over the years, but there is still a lot more that needs to be covered at the elementary level. The students take general science courses in the sixth grade to prepare them for their future courses.

PARTNERSHIP SCHOOL STUDENTS: Mr. Bourghese has observed that these students in the sixth grade with very high interest levels and they are highly motivated. As far as capability, he sees them on the same levels as the other students. He says that these students have higher than average scientific knowledge. They are very confident and more secure than other students in the area of science. Partnership School students are highly effective in communicating their knowledge.

"They came in with more confidence. They knew what was going on. They had good surface knowledge."

Mr. Bourghese noted one specific example of a Partnership School student applying her knowledge to a class activity. The class was dissecting fetal pigs and then reassembling the parts. Although this student did not enjoy the activity she was able to demonstrate her knowledge of body systems versus organs. She also synthesized the information much better than the other students.

When asked about outstanding characteristics of Partnership School students Mr. Bourghese stated, "The Partnership School students are more confident and prepared for middle school science - especially in sixth

grade.

When Mr. Bourghese was asked his view of the Battelle-Partnership School partnership he said that he felt it is very beneficial to the students. He is amazed when he sees what is going on at Partnership School. He believes that the funding from Battelle allows these students to experience much more than other students.

Interview Responses
Ginny Norman
Sixth Grade Science/Math Teacher
Park Ridge Middle School

July 3,1996

GENERAL:

In general Mrs. Norman feels that students come into middle school with high interest levels and they have a desire for more hands-on learning. She believes that students' interest levels are influenced greatly by their previous experiences and home environment. She feels that the students' readiness skills are average, but their reading skills are sometimes lacking. She believes that the students are ready to move into new areas for the most part and that they can effectively communicate the knowledge that they do have.

PARTNERSHIP SCHOOL:

Mrs. Norman has had three students from Partnership School in her science and math classes. Two of the students were given an award of excellence for the entire sixth grade. This award was to honor good students throughout the grade level with exemplary behavior and academics. She immediately recognized these students as excellent students with very high ability levels. She described their interest levels as very high as well as their knowledge levels. They are able to effectively communicate their knowledge. She feels that these students are very confident and are extremely comfortable in the areas of science and math. These students are able to apply their knowledge to areas other than the obvious. Mrs. Norman feels that these students think of things in a scientific manner and they are always questioning why. They are open to opinions that differ from their own as long as it is a logical explanation. When asked about dominant traits these students have in common, Mrs. Norman stated that they were far more confident in their ability and they have better social skills. She believes that these students have such confidence because of their different experiences with science resulting from their partnership. These students often emerge as strong leaders in the class. She believes that the partnership is very beneficial to the students because it shows them that people in the community are concerned about their education and are willing to be a part of their learning.

Interview Responses
Brian Basham
Seventh/Eighth Grade Science Teacher
Park Ridge Middle School

July 8, 1996

GENERAL QUESTIONS: Mr. Basham believes that students interest levels vary, depending on their ability levels. He feels that students readiness skills when entering the middle school also vary, depending on their prior experiences and the teachers that they have had in previous years. Students, in his opinion, are able to communicate their knowledge effectively for the most part.

PARTNERSHIP SCHOOL STUDENTS: He has had a good sampling of Partnership School students in his classes. From his experience with them he has observed that all of these students have high interest in science. Even if they are not the "best" student they are still highly interested in science. He also feels that the majority of these students are highly motivated and are hard workers. The Partnership School students come in with very high knowledge levels and they are able to apply their knowledge in relation to other concepts. This is a skill that not all of his students from other schools have. These students are able to communicate their knowledge very well. They often bring differing perspectives to class discussions. They feel very strongly about their ideas and opinions, but they are open to other differing opinions as long as they are logical. Mr. Basham feels that these students are more likely than others to question everyday phenomena. He has observed that these students are typically the students who do well and are involved in all areas of the school environment. They are achievers and are often class leaders. These students are very comfortable in science courses because of their previous experiences with science. He believes that the partnering program is highly beneficial for the students involved because they are constantly being challenged. He believes that these students need the constant challenges that the partnership places before them in order to achieve all that they are capable of. He also feels that the program provided these students with leadership qualities that will benefit them in their future career choices.

Interview Responses
Angela Trapp
Seventh Grade Math Teacher
Algonquin Middle School

Phone Interview
July 8, 1996

GENERAL QUESTIONS: Ms. Trapp feels that the interest levels of her students varies depending on the type of instruction that they received in elementary school. She believes that all students have the ability to do well in math, but they are influenced by the way they have been taught in the past. If they were taught in creative ways she feels that even the "challenged" students can succeed. Ms. Trapp teaches the low level math classes so she sees that students who have lower ability levels. She has students entering her class without knowing their basic facts (whole numbers) and they are often afraid to take risks in problem solving. Her students typically do not effectively communicate their knowledge and this is a skill that they learn in her class throughout the year.

PARTNERSHIP SCHOOL STUDENTS: Ms. Trapp had a small sampling of Partnership School students in her classes. Overall these students have high interest levels and are highly motivated in math. They often have varied levels of knowledge. Some of her students are on the cut off for the higher level classes, and some are on the other end of the spectrum. Even those Partnership School students who were on the low end of the spectrum always gave their very best effort. She feels that the students from Partnership School are more capable of communicating their knowledge than her other students. Regardless of their ability levels these students came out as leaders in small group activities. Ms. Trapp states that these students made very good leaders. They were not trying to take charge of the group, but they managed the groups effectively. The Partnership School students seemed very comfortable in the area of math and they try hard regardless of their skill level. The Partnership School students are more willing to take risks in problem solving more than the other students. Ms. Trapp feels that the partnership program is beneficial to the students because it shows them that the community is involved in their education and that they care. She feels that all schools should have the opportunity to involve businesses in the education of their students.

Interview Responses
Sally Cutajar
Seventh/Eighth Grade Science Teacher
Calumet Middle School

July 8, 1996

GENERAL QUESTIONS: Mrs. Cutajar believes that students' interest levels vary depending on the elementary that they attended. She feels that the students from the magnet schools have higher interest levels than the other students. She believes the same to be true with readiness skills. Those who attended magnet schools are more prepared than the other students.

PARTNERSHIP SCHOOLSTUDENTS: It was very difficult for Mrs. Cutajar to make generalizations from the small group of Partnership School students that she has had in class. Typically, she feels that the Partnership School students have high interest levels. She stated that on more than one occasion a Partnership School student has told her how much he/she loves science. She also said that the Partnership School students talk about their partnership in reference to what they are doing in class. One example was when they were doing a unit on hot air balloons the students that had attended Partnership School talked about the similar activities that they had done with the partner about the same topic. These students have a good knowledge base and are able to apply their knowledge to what is going on in their classes. She believes that the majority of these students are self motivated and they are independent learners. These students come out as leaders in their science groups. They are very comfortable in the science classes and they bring different perspectives to class discussions. They are also very open to opinions differing from their own. Mrs. Cutajar feels that the partnership is very beneficial to the students because it shows them that they can use their knowledge of science in the workplace setting. She feels that if the partnership encourages even one student to enter a job in the field of science that it is well worth it. She says that the students really enjoy the program and speak very positively of their partnership experience. She has one female student from Partnership School that wants to have a career in science!

Interview Response
Linda Dennis
Seventh Grade Math Teacher
Calumet Middle School

July 3,1996

GENERAL:

Mrs. Dennis believes that her students' interest levels vary, depending on ability levels. She feels that their readiness skills are average, but could be improved. She believes that they are able to communicate their knowledge more effectively as the year progresses, but they struggle at the beginning of the year.

PARTNERSHIP SCHOOL:

Mrs. Dennis only had two Partnership School students in class and they were very different from one another, so it was difficult for her to make generalizations about them. Both students came into the class with enthusiasm, but one of them had higher skills while the second struggled. The struggling student was below average in ability and was lacking confidence. She could complete homework fairly well, but she often experienced test anxiety. Mrs. Dennis feels that the confidence level of the students is relative to their ability level.

Although these students were very different, they were willing to use their knowledge to help other students through tutoring programs. Mrs. Dennis feels that the partnership is beneficial to the students, but she sees very few ties to the math curriculum.

APPENDIX C

HIGH SCHOOL COURSE CHOICE DATA

APPENDIX C

HIGH SCHOOL COURSE CHOICE DATA

Following are the high school choices in math and science for the fifth grade students attending the partnership school and Comparison School C during the 1991-92 (the class of 1999) school year and for students attending the partnership school and Comparison Schools A and C during the 1992-93 school year (the class of 2000). No student lists were available from Comparison School A for 1991-92 and Comparison School C for 1991-92 and 92-93. The course choice data starts with ninth grade because that is the first time students can make a course selection in the district that was the focus of the evaluation.

The number of students from each school enrolled in the specific courses are presented. In the tenth grade math choices, the total exceeds the number of students because some students were enrolled in more than one class.

Course Section Data
Math and Science Course Choices
9th Grade 1995-96 (Class of 1999)

Math Course*	Partnership School (16) (Number of Students / %)		Comparison School C (63) (Number of Students / %)	
Integrated Math 2	4	25.00%	14	22.22%
Algebra 1	10	62.50%	34	53.96%
Geometry Honors	2	12.50%	14	22.22%
Comp-Aid Math	0	0.00%	1	1.58%

Science Course**	Partnership School (16) (Number of Students / %)		Comparison School C (63) (Number of Students / %)	
Academic Biology	2	12.50%	18	28.57%
Scientific Biology	7	43.75%	27	42.85%
Academic Geology	2	12.50%	3	4.76%
Academic Ecology	4	25.00%	10	15.87%
Academic Chemistry	0	0.00%	3	4.76%
Scientific Chemistry	0	0.00%	1	1.58%
Scientific Physics	0	0.00%	1	1.58%
no course	1	6.255	0	0.00%

* The "Honors" courses are higher level. See attached Mathematics course descriptions.
** The "Scientific" Course may be more accelerated. See attached science course descriptions.

Math and Science Course Choices
10th Grade 1996-97 (Class of 1999)

Math Course	Partnership School (16) (Number of Students / %)		Comparison School C (63) (Number of Students / %)	
Integrated Math 1	0	0.00%	6	9.52%
Integrated Math 2	4	25.00%	5	7.93%
Algebra Basic	0	0.00%	1	1.58%
Algebra 1	0	0.00%	7	11.11%
Algebra 2 Honors	4	25.00%	24	38.09%
Geometry	6	37.50%	14	22.22%
Geometry Honors	2	12.5%	11	17.46%
No Math	0	0.0%	1	1.58%

Science Course	Partnership School (16) (Number of Students / %)		Comparison School C (63) (Number of Students / %)	
Academic Biology	1	6.25%	5	7.93%
Advanced Biology	0	0.00%	1	1.58%
Academic Geology	2	12.50%	3	4.76%
Academic Ecology	2	12.50%	12	19.04%
Scientific Ecology	1	6.25%	7	11.11%
Academic Chemistry	2	12.50%	10	15.87%
Scientific Chemistry	6	37.50%	17	26.98%
Scientific Physics	0	0.00%	1	1.58%
Science II	1	6.25%	0	0.00%
Science Learning Center	0	0.00%	3	4.76%
no course	0	0.00%	6	9.52%

Math and Science Course Choices
9th Grade 1996-97 (Class of 2000)

Math Course	Partnership School (21) (Number of Students / %)		Comparison School A (22) (Number of Students / %)		Comparison School C (55) (Number of Students / %)	
Integrated Math 1	16	28.57%	3	13.63%	16	29.09%
Algebra 1	12	57.14%	14	63.63%	21	38.18%
Algebra 2 Honors	0	0.00%	1	4.54%	0	0.00%
Geometry	0	0.00%	0	0.00%	1	1.81%
Geometry Honors	3	14.28%	4	18.18%	16	29.09%
Compaid Math	0	0.0%	0	0.00%	1	1.81%

Science Course	Partnership School (21) (Number of Students / %)		Comparison School A (22) (Number of Students / %)		Comparison School C (55) (Number of Students / %)	
Academic Biology	11	52.38%	11	50.00%	23	41.81%
Scientific Biology	3	14.28%	4	18.18%	16	29.09%
Academic Geology	3	14.28%	4	18.18%	2	3.63%
Scientific Geology	0	0.00%	2	9.09%	1	1.81%
Academic Ecology	3	14.28%	1	4.54%	9	16.36%
Scientific Ecology	1	4.76%	0	0.00%	1	1.81%
Academic Chemistry	0	0.00%	0	0.00%	1	1.81%
Scientific Chemistry	0	0.00%	0	0.00%	2	3.63%

Course Descriptions from District High School Course Handbook

MATHEMATICS

A broad range of mathematics courses is offered so that students may elect courses which will extend their mathematical competency, are compatible with their abilities and provide a basis for future career preparation. Two credits in mathematics are required for graduation from high school. Students successfully completing any two of these courses during grades 9 through 12 shall fulfill the mathematics requirement.

Students should seek the help of their parents and the recommendations of their mathematics teachers and counselor in determining which course to select. Any student completing a course with an A or B and teacher recommendation may enroll in the Honors Section. Any Honors student with a D or F must drop from the Honors program. Poor achievement in any class makes success in the following class unlikely. Successful completion of a course provides the skills necessary for continuation in the mathematics sequence.

The mathematics course selections are shown below. All courses require a calculator; check the course description for type.

No.	Course	Gr.	Gr.	Gr.	Gr.	Length	Pds.	Credit	Page
149	Computer Aided Instruction	9	10	11	12	Year	1	1.00	38
151	Integrated Math 1	9	10	11	12	Year	1	1.00	39
152	Basic Algebra		10	11	12	Year	1	1.00	39
153	Integrated Math 2		10	11	12	Year	1	1.00	39
157	Algebra 1 (8)	9	10	11	12	Year	1	1.00	39
159	Geometry	9	10	11	12	Year	1	1.00	40
161	Honors Geometry	9	10	11	12	Year	1	1.00	40
163	Pre-College Mathematics				12	Year	1	1.00	40
165	Algebra 2		10	11	12	Year	1	1.00	40
167	Honors Algebra 2		10	11	12	Year	1	1.00	41
168	Functions, Stats., & Trig.				12	Year	1	1.00	41
169	Algebra 3			11	12	Year	1	1.00	41
171	Honors Algebra 3			11	12	Year	1	1.00	41
172	Adv. Placement Calculus				12	Year	1	1.00	41
174	Computer Mathematics		10	11	12	Semester	1	.50	42
176	Pascal Programming *see prerequisites					Semester	1	.50	42
178	Statistics/Probability *see prerequisites					Semester	1	.50	42

COURSE DESCRIPTIONS

149 COMPUTER AIDED INSTRUCTION Year 9-10-11-12 1.00 credit
Repeatable for 2 credits

Prerequisite: Teacher recommendation, with Math Facilitator approval only

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COMPUTER AIDED INSTRUCTION continued

This course is an individualized program designed to identify and remediate individual student's particular weaknesses in Mathematics. Topics covered include those skills which are tested on the Ninth Grade Proficiency Test.

Experiences will include an emphasis on Computer Aided Instruction. Successful completion of two years will meet minimum math graduation requirements. Success in CAI 1 or CAI 2 may qualify a student for Integrated 1.

151 INTEGRATED MATH 1 **Year** **9-10-11-12** **1.00 credit**

Prerequisite: A, B, C, or D in Exploration Math 8 or A with teacher recommendation in Discovery Math 8.

This course is an integrated approach to selected elementary concepts in algebra, geometry, problem solving, rational numbers, data analysis and consumer applications. Successful completion of Integrated Math 1 will allow a student to enroll in Integrated Math 2, Algebra 1 or Elementary Algebra 1 with teacher recommendation.

Approximate Cost: $15.00 for a scientific calculator.

152 BASIC ALGEBRA **Year** **10-11-12** **1.00 credit**

This course is designed for the student who has earned credit in Integrated 1 but has not mastered the concepts in Integrated 1. Basic Algebra will focus on the pre-algebra skills needed to be successful in Integrated 2. Students enrolled in Basic Algebra will have the added time to develop self-confidence and success with Algebra skills. All students completing Basic Algebra will continue on into Integrated 2.

Approximate Cost: $15.00 for a scientific calculator.

153 INTEGRATED MATH 2 **Year** **10-11-12** **1.00 credit**

Prerequisite: C or better in Integrated Math 1.

This course furthers the student's knowledge of topics covered in Integrated 1. This course qualifies the student to continue his mathematics education with Geometry or Senior Pre-College Math. Credit earned in this course is equivalent to an Algebra 1 credit.

Approximate Cost: $15.00 for a scientific calculator.

157 ALGEBRA 1 **Year** **(8) 9-10-11-12** **1.00 credit**

Prerequisite: An "A" in Exploration Math 8 with teacher recommendation, C or better in Preparation for Algebra or an A in Integrated Math 1 with teacher recommendation.

This course is designed to provide a solid foundation for all future work in mathematics. The major emphasis is placed on the meaning of mathematical structures. A strong background in arithmetic, especially fractions and decimals is essential.

This course is the basis for all mathematics courses in the technical/college preparatory sequence and is very demanding of your time and effort.

Approximate Cost: $15.00 for a scientific calculator.

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159 GEOMETRY **Year** **9-10-11-12** **1.00 credit**

Prerequisite: An A or B in 8th grade Algebra 1, C or better in Algebra 1 or C or better in Integrated Math 2.

This course stresses the applications of geometric properties and the development of formal deductive proofs. There is a continual review of algebra as it relates to the applications of geometry.

Approximate Cost: $15.00 for a scientific calculator.

161 HONORS GEOMETRY **Year** **9-10-11-12** **1.00 credit**
1.125 weighted factor

Prerequisite: A or B in Algebra 1 and teacher recommendation.

This course blends the concepts of two-dimensional plane geometry and three-dimensional space geometry. The major objectives of the course are to instill an appreciation of the significance of logical and formal demonstration of proofs and to acquaint students with effective methods of clear, impartial thinking, critical evaluation, and intelligent generalization. Significant time will be spent utilizing and extending the techniques learned in Algebra 1.

Students electing this course should have an interest in mathematics and success in Algebra 1.

Approximate Cost: $15.00 for a scientific calculator.

163 PRE-COLLEGE MATHEMATICS **Year** **12** **1.00 credit**

Prerequisite: Level 4 or 5 on the OSU Early Placement Test and C or better in Integrated Math 2 or Geometry credit and teacher recommendation.

Pre-college mathematics, developed in conjunction with The Ohio State University Department of Mathematics, is designed for students who would normally experience some difficulty in Geometry and/or Algebra 2. Enrollment is open to those students who have taken the Early Mathematics Placement Test and whose score (level 4 or 5) indicates that they would be required to enroll in remedial mathematics courses at the college or university level.

This course is a numerical, problem-solving approach to geometry and algebra that involves considerable use of the calculator and graphing. Past student experience indicates that to do well in this course requires at least five hours per week of out-of-class study. Successful completion of this course should improve your understanding of mathematics sufficiently to avoid remedial college-level mathematics courses.

Approximate Cost: $15.00 for a scientific calculator.

165 ALGEBRA 2 **Year** **10-11-12** **1.00 credit**

Prerequisite: Honors Geometry credit or C or better in Geometry.

This course is for students who need math beyond Algebra 1 and geometry to meet most college entrance requirements. This course deals with the fundamental concepts of the college-preparatory Algebra 2 course.

Approximate Cost: $15.00 for a scientific calculator or purchase acceptable calculator.

167 **HONORS ALGEBRA 2** **Year** **10-11-12** **1.00 credit**
1.125 weighted factor

Prerequisite: C or better in Honors Geometry. A or B in Geometry and teacher recommendation.

Honors Algebra 2 expands the foundational facts, concepts, and skills of algebra. Conscientious and capable students will enjoy Honors Algebra 2 because it presents an opportunity to expand and extend their mathematical knowledge.

This is an advanced-level course designed for the college-bound student who has a strong algebraic background and shows an interest in a profession which requires advanced algebraic skills. A considerable amount of time is spent on mathematical proof and theory.

Approximate Cost: $15.00 for a scientific calculator or purchase acceptable calculator.

168 **FUNCTIONS, STATISTICS, AND TRIGONOMETRY** **Year** **12** **1.00 credit**

Prerequisite: Algebra 2 credit and teacher recommendation.

Functions, Statistics, and Trigonometry is designed to enhance skills in such topics as trigonometry, use and analysis of functions, and various topics from statistics.

Approximate Cost: $80-$90 for a graphing calculator.

169 **ALGEBRA 3** **Year** **11-12** **1.00 credit**

Prerequisite: C+ or better in Algebra 2 or Honors Algebra 2 credit.

This is a very rigorous course that extends algebraic concepts and includes many pre-calculus ideas. Considerable time is devoted to mathematical proof, analytical geometry, trigonometry, sequences, series and limits. Algebra 3 is not merely an extension of Algebra 2. Algebra 3 is theory-oriented, tackling the most difficult problems. Students electing this course should have above-average grades in previous mathematics courses and have plans to continue their study of mathematics at the college level. Students must be able to spend a great deal of out-of-class time on this subject in order to be successful.

The student is required to have a graphing calculator available for daily use.

Approximate Cost: $80-$90 for a graphing calculator.

171 **HONORS ALGEBRA 3** **Year** **11-12** **1.00 credit**
1.125 weighted factor

Prerequisite: C or better in Honors Algebra 2 or A or B in Algebra 2 with teacher recommendation.

Honors Algebra 3 further expands the Honors program by dealing with Algebra 3 topics. This theory-oriented course covers many topics with vigorous proof and is recommended only for students with a strong algebraic background and showing an interest in a profession which requires advanced algebraic skills.

Approximate Cost: $80-$90 for a graphing calculator.

172 **ADVANCED PLACEMENT CALCULUS** **Year** **12** **1.00 credit**
1.250 weighted factor

Prerequisite: A in Algebra 3 with teacher recommendation or C or above in Honors Algebra 3.

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172 **ADVANCED PLACEMENT CALCULUS** continued

Calculus is a unifying course including all concepts from the previous courses of high school mathematics. Calculus includes a study of functions, limits, analytical geometry, derivations and integrations. An introduction to this subject should prepare the student for rigorous college-level calculus courses. Students enrolled in this course are eligible to take the Advanced Placement Calculus Test in May. Above-average performance on the A.P. Calculus test may qualify the student for college credit and/or placement in advanced college courses. Students who take the Advanced Placement Test in May will be required to pay the test fee.

174 **COMPUTER MATHEMATICS** **Semester** **10-11-12** **.50 credit**

Prerequisite: Algebra I or Integrated Math 1 and 2
Grading: Satisfactory/Unsatisfactory

This course is designed to familiarize the student with the basic operation and method of programming a computer. Students will learn to write programs in the BASIC computer language. While the major portion of the course is devoted to programming, the course includes other topics, such as flowcharts, the general structure and components of a computer system, problem solving and the hands-on use of a computer and its peripheral equipment.

An extensive mathematics background is not required since each student is encouraged to select applicable problems based on ability and interests. The course is evaluated on a pass/fail criterion and will require several hours per week of out-of-class preparation. It is recommended for the technical school student or college bound student who plans to pursue a science, mathematics or business management oriented career.

176 **PASCAL PROGRAMMING** * **Semester** **10-11-12** **.50 credit**

Prerequisite: Computer Mathematics or permission of instructor
Grading: Satisfactory/Unsatisfactory

Pascal is a complete language which is becoming the standard college-level "freshman" class for computer science and engineering majors. This course is designed for the student who has a serious interest in programming. It will familiarize the student with the capabilities and potential of Pascal as a teaching language. The course will stress applications of structured programming techniques in the areas of science, mathematics and business. Students will learn the syntax of Pascal, the use of the Editor and Filer functions, and the use of modular programming design.

178 **STATISTICS/PROBABILITY** * **Semester** **11-12** **.50 credit**

Prerequisite: Algebra II or (Geometry, permission of instructor)
Grading: A,B,C,D,F, or Satisfactory/Unsatisfactory

This course is designed to introduce and familiarize the students with the concepts of probability and statistics. A strong emphasis will be placed on the importance of these concepts in analyzing data from typical life situations. An extensive mathematical background is not necessary, but a working knowledge of algebra is mandatory. The course will be evaluated on a pass/fail or letter-grade basis. Grade option shall be chosen by the student in conference with the teacher prior to the completion of the first grading period.

This course is recommended as an additional mathematics course for technical school or college-bound students who plan a career in science, mathematics, or business management.

SCIENCE

Science courses in grades nine through twelve offer students a wide variety of choice. Traditional laboratory sciences are options for all students beginning in ninth grade. One science credit is required for graduation. At least two years of laboratory science study are needed to meet minimum college admission requirements.

There are no prerequisites for academic or scientific science courses. Algebra I is recommended prior to a Scientific Course and both Algebra I and Geometry are recommended for Scientific Physics; however, Geometry may be taken concurrently with the course.

Academic and Scientific courses are mutually exclusive (for example, students who earn credit for Academic Biology may not sign up for Scientific Biology because the core content of both courses is the same). Both of these courses meet the prerequisite for enrollment in the applicable Advanced course.

Students should consult with their parents, counselors, and teachers to determine the most appropriate sequence of science courses.

No.	Course	Gr.	Gr.	Gr.	Gr.	Length	Pds.	Credit	Page
200	Science Learning Center	9	10	11	12	Semester	1	Varies	51
202	Academic Biology	9	10	11	12	Year	1	1.00	51
204	Scientific Biology	9	10	11	12	Year	1	1.00	51
205	Advanced Biology		10	11	12	Semester	1	.50	51
206	Academic Chemistry	9	10	11	12	Year	1	1.00	51
208	Scientific Chemistry	9	10	11	12	Year	1	1.00	52
209	Advanced Chemistry		10	11	12	Semester	1	.50	52
210	Academic Ecology	9	10	11	12	Year	1	1.00	52
211	Scientific Ecology	9	10	11	12	Year	1	1.00	52
212	Advanced Ecology		10	11	12	Semester	1	.50	52
213	Field Studies	9	10	11	12	Year	1	1.00	53
214	Academic Geology	9	10	11	12	Year	1	1.00	53
216	Scientific Geology	9	10	11	12	Year	1	1.00	53
217	Advanced Geology		10	11	12	Semester	1	.5	53
218	Academic Physics	9	10	11	12	Year	1	1.00	54
220	Scientific Physics	9	10	11	12	Year	1	1.00	54
222	Advanced Physics		10	11	12	Semester	1	.50	54

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COURSE DESCRIPTIONS

SCIENCE LEARNING CENTER **Semester** **9-10-11-12** **Credit Varies**

The Science Learning Center (SLC) provides a highly individualized environment designed to meet the needs of all students. A unique combination of high-tech, multimedia, and science laboratory, the SLC provides opportunities for students to discover the fundamentals of science or to pursue student-selected studies. Students who select the SLC will receive credit through Educational Options (High School Course Description Book, p. xviii, 1995-96) and will be scheduled in conjunction with a study hall on a semester basis to earn annual credit short term (not less than 1/4 credit) or long term (one or more credits). Earned credit may be applied toward graduation but may not necessarily fulfill the required science credit. This credit may fulfill the required science credit only if the student has passed the science component of the Ohio Proficiency Test and is not involved in SLC intervention or remediation.

ACADEMIC BIOLOGY **Year** **9-10-11-12** **1.00 credit**

Academic Biology is intended for any high school student. Through active learning, students explore interdisciplinary science themes in the living environment. The course introduces students to the foundations in life science needed for further study in biology or any other science course.

Academic Biology is a laboratory course and open to students in grades nine through twelve. It offers one credit and meets the science credit requirement for graduation.

SCIENTIFIC BIOLOGY **Year** **9-10-11-12** **1.00 credit**
1.125 weighted factor

Recommendation: Completion of Algebra I

Scientific Biology offers the same basic concepts and skills as Academic Biology. The pace and/or depth may be accelerated to meet the needs of students who wish to pursue majors in scientific fields or careers in science. Performance expectations are commensurate with the rigor of weighted courses.

Scientific Biology is a laboratory course and open to students in grades nine through twelve. It offers one credit and meets the science credit requirement for graduation.

ADVANCED BIOLOGY **Semester** **10-11-12** **.50 credit**
1.125 weighted factor

Prerequisite: Completion of Academic or Scientific Biology

Advanced Biology is intended for student who have a very high level of interest in science and/or research careers. Instruction is highly individualized with a strong emphasis on scientific inquiry. Advanced Biology builds on the concepts and skills developed in Academic and Scientific Biology.

Advanced Biology is a laboratory course and open to students who have completed Academic or Scientific Biology. A semester in length, Advanced Biology offers a half credit of science.

ACADEMIC CHEMISTRY **Year** **9-10-11-12** **1.0 credit**

Academic Chemistry is intended for any high school student. Through active learning, students explore interdisciplinary science themes in the physical setting. The course introduces students to the foundations in chemistry needed for further study in chemistry or any other science course.

206 **ACADEMIC CHEMISTRY** continued

Academic Chemistry is a laboratory course and open to students in grades nine through twelve. It offers one credit and meets the science credit requirement for graduation.

208 **SCIENTIFIC CHEMISTRY** **Year** **9-10-11-12** **1.0 credit**
1.125 weighted factor

Recommendation: Completion of Algebra I

Scientific Chemistry offers the same basic concepts and skills as Academic Chemistry. The pace and/or depth may be accelerated to meet the needs of students who wish to pursue majors in scientific fields or careers in science. Performance expectations are commensurate with the rigor of weighted courses.

Scientific Chemistry is a laboratory course and open to students in grades nine through twelve. It offers one credit and meets the science credit requirement for graduation.

209 **ADVANCED CHEMISTRY** **Semester** **10-11-12** **.50 credit**
1.125 weighted factor

Prerequisite: Completion of Academic or Scientific Chemistry

Advanced Chemistry is intended for students who have a very high level of interest in a science and/or research careers. Instruction is highly individualized with a strong emphasis on scientific inquiry. Advanced Chemistry builds on the concepts and skills developed in any Academic or Scientific science course.

Advanced Chemistry is a laboratory course and open to students who have completed Academic or Scientific Chemistry. A semester in length, Advanced Chemistry offers a half credit of science.

210 **ACADEMIC ECOLOGY** **Year** **9-10-11-12** **1.00 credit**

Academic Ecology is intended for any high school student. Through active learning, students explore interdisciplinary science themes in the environment. The course introduces students to the foundations in ecology needed for further study in any other science course and explores the interrelationships between living and nonliving systems.

Academic Ecology is a laboratory course and open to students in grades nine through twelve. It offers one credit and meets the science credit requirement for graduation.

211 **SCIENTIFIC ECOLOGY** **Year** **9-10-11-12** **1.00 credit**
1.125 weighted factor

Recommendation: Completion of Algebra I

Scientific Ecology offers the same basic concepts and skills as Academic Ecology. The pace and/or depth may be accelerated to meet the needs of students who wish to pursue majors in scientific fields or careers in science. Performance expectations are commensurate with the rigor of weighted courses.

Scientific Ecology is a laboratory course and open to students in grades nine through twelve. It offers one credit and meets the science credit requirement for graduation.

212 **ADVANCED ECOLOGY** **Semester** **10-11-12** **.50 credit**
1.125 weighted factor

Prerequisite: Completion of Academic or Scientific Ecology

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212 **ADVANCED ECOLOGY** continued

Advanced Ecology is intended for students who have a very high level of interest in science and/or research careers. Instruction is individualized with a strong emphasis on scientific inquiry. Advanced Ecology builds on the concepts and skills developed in any Academic or Scientific science course.

Advanced Ecology is a laboratory course and open to students who have completed Academic or Scientific Ecology. A semester in length, Advanced Ecology offers a half credit of science.

213 **FIELD STUDIES** **Year** **9-10-11-12** **1.00 credit**

Prerequisite: Parental permission and teacher recommendation
Approximate Cost: $50.00 lab fee

Field Studies is intended for students who have a high level of interest in science and/or research careers. Instruction is highly individualized with a strong emphasis on scientific inquiry and conducting field research. Field Studies is a laboratory course and students will be screened and admitted with parental permission, and teacher recommendation. There is a $50.00 lab fee.

214 **ACADEMIC GEOLOGY** **Year** **9-10-11-12** **1.00 credit**

Academic Geology is intended for any high school student. Through active learning students explore interdisciplinary science themes related to earth and space. The course introduces students to the foundations in geology needed for further study in any other science course.

Academic Geology is a laboratory course and open to students in grades nine through twelve. It offers one credit and meets the science credit requirement for graduation.

216 **SCIENTIFIC GEOLOGY** **Year** **9-10-11-12** **1.00 credit**
1.125 weighted factor

Recommendation: Completion of Algebra I

Scientific Geology offers the same basic concepts and skills as Academic Geology. The pace and/or depth may be accelerated to meet the needs of students who wish to pursue majors in scientific fields or careers in science. Performance expectations are commensurate with the rigor of weighted courses.

Scientific Geology is a laboratory course and open to students in grades nine through twelve. It offers one credit and meets the science credit requirement for graduation.

217 **ADVANCED GEOLOGY** **Semester** **10-11-12** **.50 credit**
1.125 weighted factor

Prerequisite: Completion of Academic or Scientific Geology

Advanced Geology is intended for students who have a very high level of interest in science and/or research careers. Instruction is highly individualized with a strong emphasis on scientific inquiry. Advanced Geology builds on the concepts and skills developed in any Academic or Scientific science course.

Advanced Geology is a laboratory course and open to students who have completed Academic or Scientific Geology. A semester in length, Advanced Geology offers a half credit of science.

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218 ACADEMIC PHYSICS | **Year** | **9-10-11-12** | **1.00 credit**

Academic Physics is intended for any high school student. Through active learning students explore interdisciplinary science themes in the physical setting. The course introduces students to the science foundations needed for further study in any other science course.

Academic Physics is a laboratory course and open to students in grades nine through twelve. It offers one credit and meets the science credit requirement for graduation.

220 SCIENTIFIC PHYSICS | **Year** | **9-10-11-12** | **1.00 credit**
1.125 weighted factor

Recommendation: Completion of Algebra I and Geometry. Geometry may be taken concurrently with the course.

Scientific Physics offers the same basic concepts and skills as Academic Physics. The pace and/or depth may be accelerated to meet the needs of students who wish to pursue majors in scientific fields or careers in science. Performance expectations are commensurate with the rigor of weighted courses.

Scientific Physics is a laboratory course and open to students in grades nine through twelve. It offers one credit and meets the science credit requirement for graduation.

222 ADVANCED PHYSICS | **Semester** | **10-11-12** | **.50 credit**
1.125 weighted factor

Prerequisite: Completion of Academic or Scientific Physics.

Advanced Physics is intended for students who have a very high level of interest in science and/or research careers. Instruction is individualized with a strong emphasis on scientific inquiry. Advanced Physics builds on the concepts and skills developed in any Academic or Scientific science course.

Advanced Physics is a laboratory course and open to students who have completed Academic or Scientific Physics. A semester in length, Advanced Physics offers a half credit of science.

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APPENDIX D

STUDENT FOCUS GROUP TRANSCRIPT

Transcription of Focus Group Video
Partnership School Alumni

Participants: Amber, Liam, Tyler, Michelle, Devonna, Keegan

Focus Group Leader: I'm working for the Science & Math Network and my job this summer has been to evaluate the partnership program and see how we're doing. I've talked to teachers, I've done some different things to see, and now I'm going to talk to you about what you thought, what you liked about it.

The first thing I want to know is, when you hear the word "science," what the first thing that pops into your head?

Liam: Fun.

Keegan: Experiments

Michelle: Experiments. Field trips.

Focus Group Leader: Where's your favorite place to go?

Michelle: COSI

Devonna: Gravity

Tyler: Chemistry

Focus Group Leader: Liam, you said "fun." Why do you think fun?

Liam: My mom's a chemistry teacher and stuff we did in class I could take home and see if she knew about it, and there was this one thing that we did but my Mom never did, and she teaches at Westerville North, and so she did it with her class and they really liked it.

Focus Group Leader: Keegan, you said "experiments." What's your favorite experiment?

Keegan: We took batteries and made a light bulb light up.

Focus Group Leader: Did you do that with your partner?

Keegan: Yeah.

Focus Group Leader: Amber, you said "learning." What did you learn most from science? What was the most interesting thing you found?

Amber: When we made a battery out of a lemon.

Focus Group Leader: Michelle, you "experiments," too, and "field trips."

Michelle: We did one a week, there was always something new to try, and if we had a question, we would try to figure it out. I liked COSI, cause when we went, we would learn something, and we'd still have time to walk around and just see other things - I like that place.

Focus Group Leader: So you were learning something while you were having fun.

Focus Group Leader: Devonna, you said "gravity."

Devonna: How gravity works and how it compares to science.

Focus Group Leader: Is there anything you learned in science that you see in the real world? Like what?

Liam: One thing we did, we got a paper and we went outside and how you could tell how fast the wind was blowing, just by looking at objects.

Tyler: You could see how chemicals go together to make up another substance.

Focus Group Leader: How do you feel about science? When you know you're going into a new school year, are you nervous? Excited? What are you thinking?

Keegan: I'm pretty nervous, cause I don't know what to expect, but once I'm there, it's better.

Focus Group Leader: It's pretty simple for you?

Keegan: Yeah.

Amber: Sometimes they repeat things I know.

Tyler: Sometimes a teacher will teach a different way, so that kind of confuses me, but usually I do okay.

Liam: One thing I hope is I hope I don't need to dissect things, cause I can't take something that was alive and kill it. I would probably pretend to be sick that day.

Amber : I hope they don't go over the same things over and over again. The exact same experiment we did in fifth grade we did in sixth agreed and that wasn't fun.

Michelle: I like science . . . because we got to go on field trips to COSI and stuff. I like science in high school because you can choose to do something you've never done before. In middle school you don't get to do that .

Devonna: I'm kind of excited, cause I get to learn things I didn't get to in middle school and elementary school. And as you get older, you get to learn about different types of science.

Focus Group Leader: Do you like science?

Everyone nods yes.

Focus Group Leader: When you go into science classes, are you comfortable, are you confident that you'll be able to do well? Yeah? (everyone nods)

Focus Group Leader: Why do you think you feel comfortable? Do you think everyone does?

Liam: I feel comfortable because I like science, and people who don't feel comfortable will be the people who don't like it.

Focus Group Leader: Anyone else?

Keegan: It depends on the teachers and the kids. Like last year, the science I took in the first quarter was okay, and then we switched classes, and the second quarter was a lot more difficult for me, cause the teacher was different, and it was a lot harder.

Focus Group Leader: When you think of your future, and the kind of career you may choose, what do you think of?

Amber: I want to be a teacher, because I enjoy helping people and I like to learn.

Devonna: I'd like to be veterinarian because it has a lot to do with math and science and cause you have to know a lot of formulas to give medicine to the animals and to help animals.

Liam: Firefighter, cause I like to take risks and I like helping people.

Keegan: Marine biologist, because I enjoy working with whales, dolphins, sea lions and learning about them.

Tyler: I'd like to be a doctor, cause I had a teacher in seventh grade who taught about bones and organisms and so that pretty much helped me.

Michelle: Kindergarten teacher because each day would be different, and a challenge. You would have to be able to keep the kids' attention and discipline them., but no too hard. You have to try different activities so that they learn.

Focus Group Leader: Thinking about your experience at the Partnership Elementary and the partnerships, what's the one thing that really sticks out in your mind about either the things that you did with your partners or your partner as a person?

Amber: In second and fourth grades, we had the same partner, Dr. Schultz. He keeps track of people. Like he send me a postcard in sixth grade when he saw my name in the newspaper.

(Liam nods too)

Keegan: I liked our fifth grade scientist cause he was really easy to talk to and my sister's in fourth grade now at the Partnership Elementary, and she receives postcards from Dr. Schultz about every two months.

Devonna: I just remember we dissected a lot, we did pig's eye.

Focus Group Leader: Can you think of one of your favorite activities you did with your partner while you were at the Partnership Elementary?

Amber: In third grade, we had an incubator and we had eggs, and we hatched them. (Liam nods that he liked that too).

Tyler: Battery from a lemon

Keegan: We didn't have chickens in third grade we had beetles instead. We had to feed them mealworms and dissect them. It was really . . . different, kind of neat.

Michelle: Owl pellets. We had to dissect them and put them together and try to match the bones to the charts to see what the owl had eaten. We also used gumdrops to make molecules and then we ate them.

Focus Group Leader: Before the scientist came in and you heard that you were going to have a scientist in your classroom, what do you remember you thought?

Tyler: It was really exciting, cause it was a new person in the classroom and we could just be with them and talk with them see what he does.
Focus Group Leader: Did you really know what scientists did before that?

Tyler: No, the teacher didn't really tell us.

Focus Group Leader: Myself personally, when I think of a scientist, I think of this guy with crazy white hair like Einstein, things like that. Did you ever think of it that way? (Everyone nods) Is that what your partner looked like?

Keegan: I thought it was the mad scientist type with all these bottles and chemistry.

Liam: Also in 2nd grade, I though scientists were people who sat down, put strange things together and see what they did, and that's not what it is.

Focus Group Leader: What did you learn from working with the scientists? Is that what they do?

Michelle: They're cool. Cause they would put scientific things into our words so that we could understand and when we did things like the gum drops, he color-coded the gum drops and that helped.

Keegan: I liked the marshmallows when we dipped them in liquid nitrogen and then they got all hard and that was one way they made sincere fun.

Focus Group Leader : And they found ways to make science more fun for you? Do you think that you enjoy science more now because of that? (Keegan smiles and says yeah.)

Amber: When I went to the Partnership Elementary, I wasn't really happy about that because I didn't really like math and science, but I really like it now.

Focus Group Leader: When you think back on your time at the Partnership Elementary, what do you think you got out of having a partner from Battelle the most? How do you think they helped you the most?

Michelle: With the scientists at the Partnership Elementary, if we had a question, they helped us, it wasn't as if they made us feel dumb. When you get to middle school, you have the courage to ask questions and you find out it's the same, no one will make fun of you. But some of my friends, they won't ask questions in class cause they're afraid someone will say something. But through the Partnership Elementary, if you do and ask a question, they'll answer and you don't feel dumb.

Focus Group Leader: Do you think that the scientists should keep coming to the school?

Keegan: Definitely.

Focus Group Leader: Why?

Keegan: It's helpful, it just helps.

Liam: It's better than talking to a teacher who does every subject in elementary school and the scientist does just science, period and they know more about it.

Amber: I was glad in third grade when we had a woman scientist and that showed that women can be scientists.

OTHER INDICATORS OF IMPACT

"I strongly believe that the partnership has had a direct impact on the high achievement of our students in mathematics and science..."

(Steve Petercsak, Jr., Principal, Longfellow Elementary)

Longfellow Magnet School
614/895-6075

120 Hiawatha Avenue, Westerville, OH 43081-2221

Stephen J. Petercsak, Principal

Ernest A. Husarik, Ph.D.
Superintendent of Schools

614/895-6080

WESTERVILLE CITY SCHOOLS

RECEIVED
JUN 28 1996
COMMUNITY RELATIONS

June 26, 1996

Linda Howard
Battelle
505 King Ave. Room A-1-11
Columbus, OH 43201

Dear Linda,

Thank you for lunch yesterday and for taking the time to choose a tree for the school in memory of my Dad. I have been quite overwhelmed by everyone's expression of sympathy and the donation of a tree to Longfellow will be a wonderful tribute.

I have enclosed copies of the results of the Fourth Grade Proficiency Test and the Second Grade Iowa Test. I was mistaken in saying we had science scores for second grade - the new tests we now administer do not include a science section but we did have great math results. In the fourth grade proficiencies for science and math, our students did a great job especially in the ability to acquire, process and extend both scientific and mathematical knowledge. Also enclosed is the 1995-1996 list of Battelle visits to Longfellow. There was 390.5 contact hours with students and this does not include end of the year visits by Pete and Phil. As soon as I get those times, I will send you a revised list.

I strongly believe that the partnership has had a direct impact on the high achievement of our students in mathematics and science and I appreciate all that you have done to help coordinate this successful partnership.

Sincerely,

Steve

Stephen J. Petercsak, Jr.

enc.

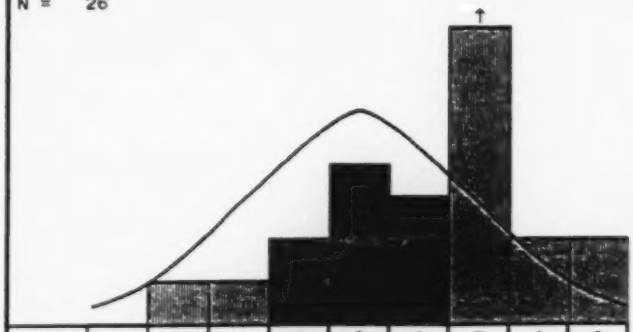
Iowa Tests of Basic Skills

Service 4a:
Group Narrative Summary
LONGFELLOW

Building:	LONGFELLOW	Grade:	2
Bldg. Code:	11	Form:	K
System:	WESTERVILLE CITY	Test Date:	2/96
Norms:	MIDYEAR 1992	Page:	36
Order No.:	000-A6001028-00-008==	Sheet:	1 of 3

LONGFELLOW
GRADE 2
N = 26

READING ADVANCED SKILLS — GRADE 2



STANINES		LONGFELLOW	NATIONAL
HIGH	(7, 8, 9)	58%	23%
AVERAGE	(4, 5, 6)	35%	54%
LOW	(1, 2, 3)	8%	23%

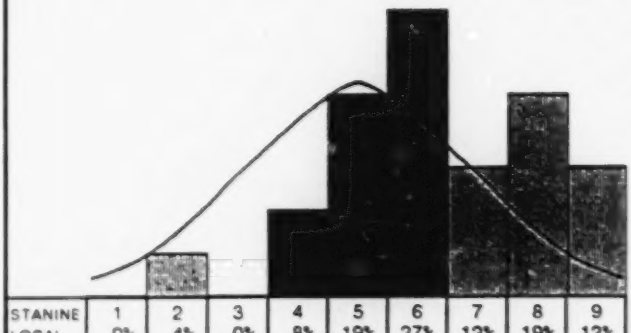
STANINE	1	2	3	4	5	6	7	8	9
LOCAL	0%	4%	4%	8%	15%	12%	42%	8%	8%
NAT'L	4%	7%	12%	17%	20%	17%	12%	7%	4%

Conclusions:
1. LONGFELLOW has more high achieving students and fewer average and low achieving students than do most other schools in the nation.

The average Reading Advanced Skills grade equivalent for LONGFELLOW grade 2 was 3.3. Compared with the national distribution of student scores, the typical student at LONGFELLOW scored the same as or higher than 77 percent of grade 2 students in the nation.

LONGFELLOW
GRADE 2
N = 26

READING TOTAL — GRADE 2



STANINES		LONGFELLOW	NATIONAL
HIGH	(7, 8, 9)	42%	23%
AVERAGE	(4, 5, 6)	54%	54%
LOW	(1, 2, 3)	4%	23%

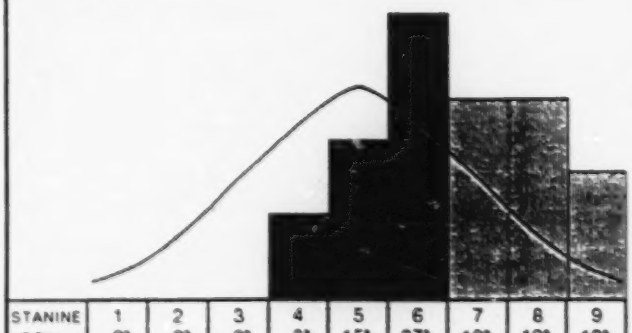
STANINE	1	2	3	4	5	6	7	8	9
LOCAL	0%	4%	0%	8%	19%	27%	12%	19%	12%
NAT'L	4%	7%	12%	17%	20%	17%	12%	7%	4%

Conclusions:
1. LONGFELLOW has about the same percent of average achieving students as do most other schools in the nation.
2. LONGFELLOW has more high achieving students and fewer low achieving students than do most other schools in the nation.

The average Reading Total grade equivalent for LONGFELLOW grade 2 was 3.3. Compared with the national distribution of student scores, the typical student at LONGFELLOW scored the same as or higher than 76 percent of grade 2 students in the nation.

LONGFELLOW
GRADE 2
N = 26

LANGUAGE ADVANCED SKILLS — GRADE 2



STANINES		LONGFELLOW	NATIONAL
HIGH	(7, 8, 9)	50%	23%
AVERAGE	(4, 5, 6)	50%	54%
LOW	(1, 2, 3)	0%	23%

STANINE	1	2	3	4	5	6	7	8	9
LOCAL	0%	0%	0%	8%	15%	27%	19%	19%	12%
NAT'L	4%	7%	12%	17%	20%	17%	12%	7%	4%

Conclusions:
1. LONGFELLOW has about the same percent of average achieving students as do most other schools in the nation.
2. LONGFELLOW has more high achieving students and fewer low achieving students than do most other schools in the nation.

The average Language Advanced Skills grade equivalent for LONGFELLOW grade 2 was 3.8. Compared with the national distribution of student scores, the typical student at LONGFELLOW scored the same as or higher than 85 percent of grade 2 students in the nation.

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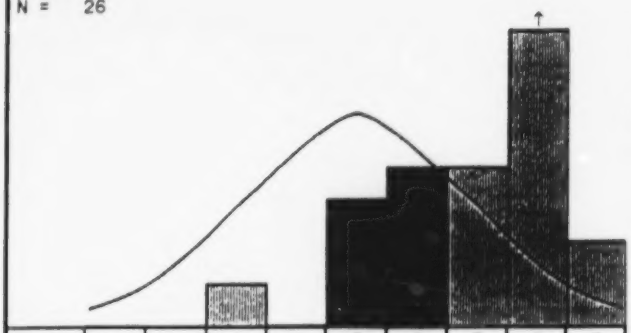
Iowa Tests of Basic Skills

Service 4a:
Group Narrative Summary
LONGFELLOW

Building:	LONGFELLOW	Grade	2
Bldg. Code:	11	Form	K
System:	WESTERVILLE CITY	Test Date	2/96
Norms:	MIDYEAR 1992	Page	37
Order No.:	000-A6001028-00-008	Sheet	2 of 3

LONGFELLOW
GRADE 2
N = 26

LANGUAGE TOTAL — GRADE 2



STANINE	1	2	3	4	5	6	7	8	9
LOCAL	0%	0%	4%	0%	12%	15%	15%	46%	8%
NAT'L	4%	7%	12%	17%	20%	17%	12%	7%	4%

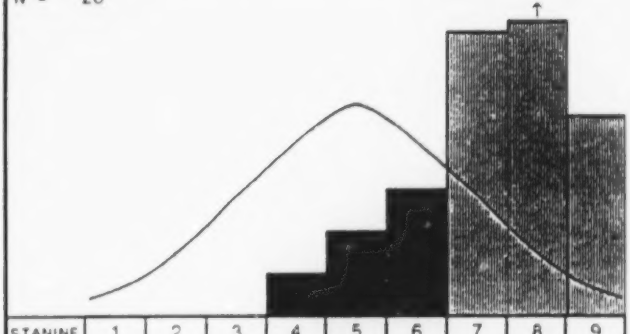
	STANINES	LONGFELLOW	NATIONAL
HIGH	(7, 8, 9)	69%	23%
AVERAGE	(4, 5, 6)	27%	54%
LOW	(1, 2, 3)	4%	23%

Conclusions:
1. LONGFELLOW has more high achieving students and fewer average and low achieving students than do most other schools in the nation.

The average Language Total grade equivalent for LONGFELLOW grade 2 was 3.6. Compared with the national distribution of student scores, the typical student at LONGFELLOW scored the same as or higher than 86 percent of grade 2 students in the nation.

LONGFELLOW
GRADE 2
N = 26

MATH ADVANCED SKILLS — GRADE 2



STANINE	1	2	3	4	5	6	7	8	9
LOCAL	0%	0%	0%	4%	8%	12%	27%	31%	19%
NAT'L	4%	7%	12%	17%	20%	17%	12%	7%	4%

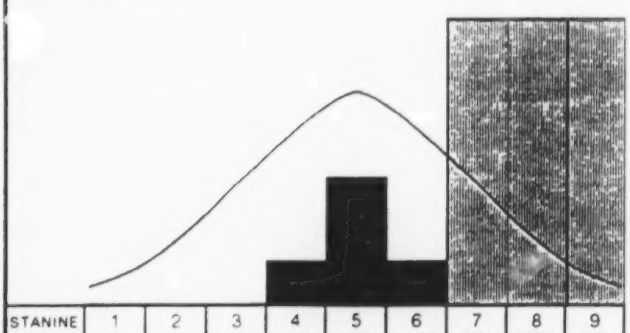
	STANINES	LONGFELLOW	NATIONAL
HIGH	(7, 8, 9)	77%	23%
AVERAGE	(4, 5, 6)	23%	54%
LOW	(1, 2, 3)	0%	23%

Conclusions:
1. LONGFELLOW has more high achieving students and fewer average and low achieving students than do most other schools in the nation.

The average Math Advanced Skills grade equivalent for LONGFELLOW grade 2 was 4.0. Compared with the national distribution of student scores, the typical student at LONGFELLOW scored the same as or higher than 89 percent of grade 2 students in the nation.

LONGFELLOW
GRADE 2
N = 26

MATH TOTAL — GRADE 2



STANINE	1	2	3	4	5	6	7	8	9
LOCAL	0%	0%	0%	4%	12%	4%	27%	27%	27%
NAT'L	4%	7%	12%	17%	20%	17%	12%	7%	4%

	STANINES	LONGFELLOW	NATIONAL
HIGH	(7, 8, 9)	81%	23%
AVERAGE	(4, 5, 6)	19%	54%
LOW	(1, 2, 3)	0%	23%

Conclusions:
1. LONGFELLOW has more high achieving students and fewer average and low achieving students than do most other schools in the nation.

The average Math Total grade equivalent for LONGFELLOW grade 2 was 3.7. Compared with the national distribution of student scores, the typical student at LONGFELLOW scored the same as or higher than 89 percent of grade 2 students in the nation.

BEST COPY AVAILABLE

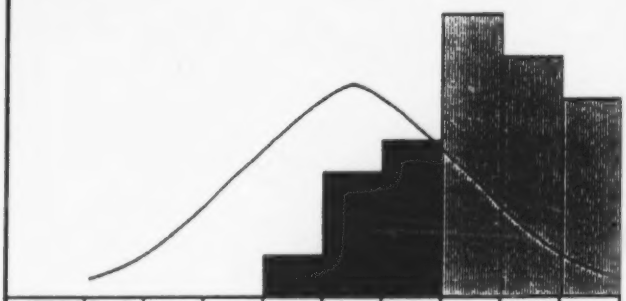
Iowa Tests of Basic Skills

Service 4a:
Group Narrative Summary
LONGFELLOW

Building:	LONGFELLOW	Grade	2
Bldg. Code:	11	Form	K
System:	WESTERVILLE CITY	Test Date	2/96
Norms:	MIDYEAR 1992	Page	38
Order No.:	000-A6001028-00-008	Sheet	3 of 3

LONGFELLOW
GRADE 2
N = 26

SURVEY BATTERY TOTAL **GRADE 2**



STANINE	1	2	3	4	5	6	7	8	9
LOCAL	0%	0%	0%	4%	12%	15%	27%	23%	19%
NAT'L	4%	7%	12%	17%	20%	17%	12%	7%	4%

	STANINES	LONGFELLOW	NATIONAL
HIGH	(7, 8, 9)	69%	23%
AVERAGE	(4, 5, 6)	31%	54%
LOW	(1, 2, 3)	0%	23%

Conclusions:
1. LONGFELLOW has more high achieving students and fewer average and low achieving students than do most other schools in the nation.

The average Survey Battery Total grade equivalent for LONGFELLOW grade 2 was 3.5. Compared with the national distribution of student scores, the typical student at LONGFELLOW scored the same as or higher than 85 percent of grade 2 students in the nation.

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1995-1996 BATTELLE - LONGFELLOW PARTNERSHIP VISITS

#	Date	Time	Partner	Activity
1	Thu, Aug 31, 1995	1.75	Taussig	Meet Dr. Taussig - Toothpick puzzles
2	Tue, Sep 5, 1995	0.75	Held	Intrduction
3	Tue, Sep 5, 1995	1	Burrows	Meet the Scientist
4	Thu, Sep 7, 1995	2.75	Taussig	Soaring Cylinders
5	Mon, Sep 11, 1995	2	Sticksel	Introduction to Scientist
6	Tue, Sep 12, 1995	1.5	Held	Sedimentary Rocks
7	Thu, Sep 14, 1995	1.75	Taussig	Soaring Cylinders
8	Mon, Sep 18, 1995	2	Sticksel	Water cycle
9	Wed, Sep 20, 1995	1	Held	Build Landfill
10	Tue, Sep 26, 1995	2	Taussig	Be a rotor promoter (contest)
11	Wed, Sep 27, 1995	2	Sticksel	Match &Fire Safety
12	Thu, Sep 28, 1995	2	Taussig	Be a rotor promoter
13	Fri, Sep 29, 1995	1.5	Held	Decimeter Dig - Insects
14	Mon, Oct 2, 1995	1.5	Held	Cubic Meters - Insects
15	Tue, Oct 3, 1995	2	Taussig	Unbelievable flying objects
16	Wed, Oct 4, 1995	1.25	Krak	Meet the students - intro.
17	Thu, Oct 5, 1995	2.5	Taussig	Unbelievable flying objects
18	Thu, Oct 5, 1995	2	Sticksel	Heat Experiment
19	Tue, Oct 10, 1995	2.25	Taussig	The Last Straw II
20	Wed, Oct 11, 1995	. 2	Sticksel	Insulators
21	Wed, Oct 11, 1995	8	Burrows	Partnership Institute
22	Wed, Oct 11, 1995	8	Krak	Partnership Institute
23	Thu, Oct 12, 1995	2.25	Taussig	Parachutes
24	Thu, Oct 12, 1995	8	Burrows	Partnership Institute
25	Thu, Oct 12, 1995	8	Krak	Partnership Institute
26	Fri, Oct 13, 1995	1.5	Burrows	food chain
27	Tue, Oct 17, 1995	1.5	Taussig	Take Home results: Individual projects
28	Thu, Oct 19, 1995	1	Held	Hidden Colors in Leaves
29	Thu, Oct 19, 1995	2	Taussig	Consumerism
30	Thu, Oct 19, 1995	2	Sticksel	Waves
31	Fri, Oct 27, 1995	1.5	Taussig	The Real Truth about Bananas
32	Tue, Oct 31, 1995	2.5	Taussig	The Paper Race
33	Thu, Nov 2, 1995	2	Taussig	That Tears It - Paper Towel Strength
34	Thu, Nov 2, 1995	2	Sticksel	Tides
35	Tue, Nov 7, 1995	1	Taussig	Consumerism review/assessment project
36	Wed, Nov 8, 1995	0.75	Held	Crayon Problem Solving
37	Wed, Nov 8, 1995	2	Sticksel	currents
38	Thu, Nov 9, 1995	0.75	Held	Crayon Problem Solving
39	Fri, Nov 10, 1995	2	Sticksel	water density
40	Tue, Nov 14, 1995	1	Held	Dig up Landfill
41	Tue, Nov 14, 1995	6.25	Taussig	Consumerism Projects; Planning for the year
42	Wed, Nov 15, 1995	3	Held	OSBA Conference
43	Thu, Nov 16, 1995	2	Sticksel	Earthquake
44	Fri, Nov 17, 1995	1.5	Burrows	Liquid nitrogen/reading thermometers
45	Tue, Nov 21, 1995	1.25	Krak	Energy and the Environment

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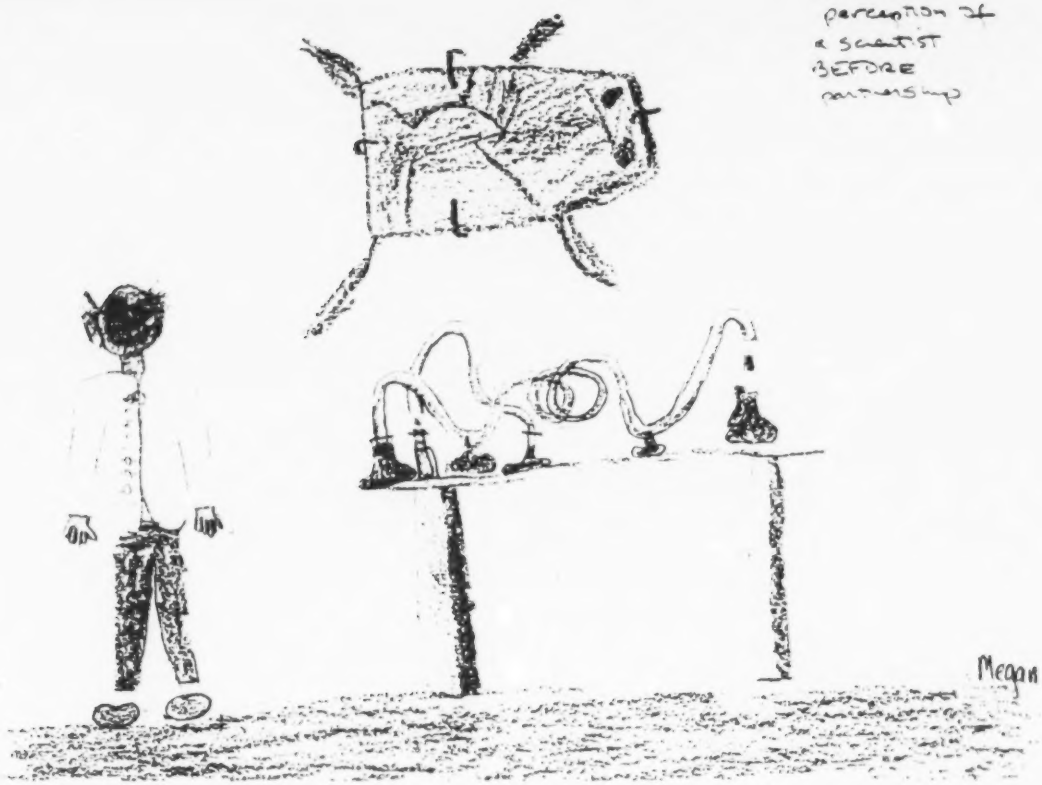
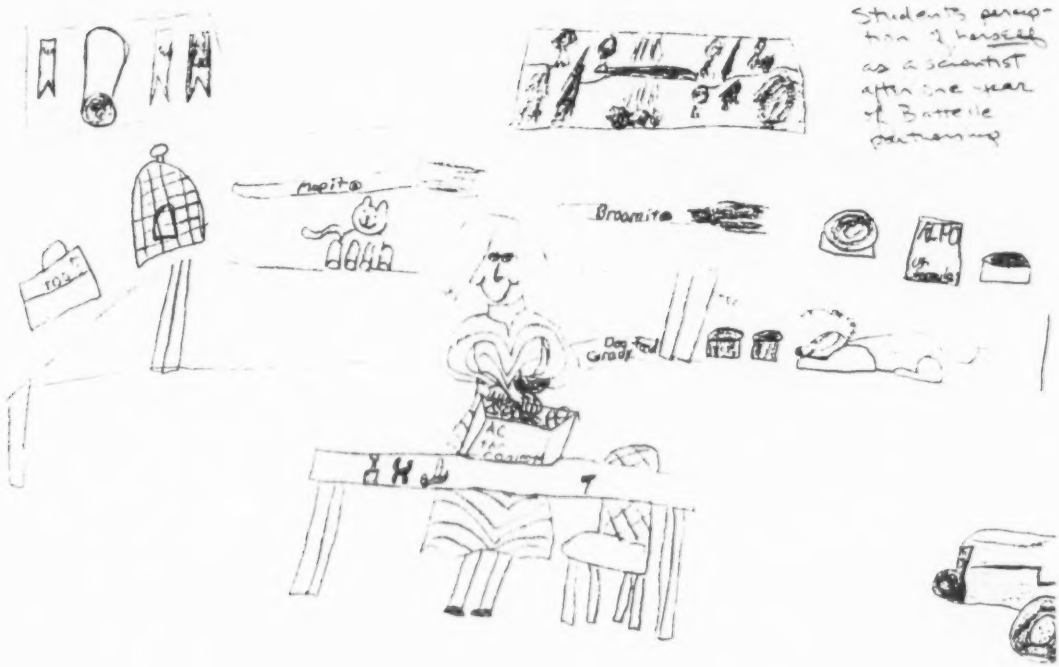
1995-1996 BATTELLE - LONGFELLOW PARTNERSHIP VISITS

46	Tue, Nov 28, 1995	6	Taussig	Indirect Evidence/Exemplary Evidence
47	Wed, Nov 29, 1995	2	Taussig	Periodic Chart of the Elements
48	Thu, Nov 30, 1995	2	Sticksel	Rock Testing
49	Tue, Dec 5, 1995	2	Taussig	AIMS: Gumdrop molecules
50	Thu, Dec 7, 1995	2	Taussig	Chromatography
51	Thu, Dec 7, 1995	2	Sticksel	Making Jello for Earthquake Experiment
52	Fri, Dec 8, 1995	45	Held	Build the Ant Farm
53	Fri, Dec 8, 1995	2	Sticksel	Earthquake Experiment with Jello
54	Tue, Dec 12, 1995	1 hr	Burrows	Chemistry with Milk - physical change
55	Fri, Dec 15, 1995	2	Sticksel	Rock Lab Test
56	Tue, Dec 19, 1995	45	Held	Crystals
57	Fri, Jan 5, 1996	2.5	Taussig	Mystery Powders
58	Tue, Jan 16, 1996	3.5	Taussig	Static Electricity
59	Tue, Jan 23, 1996	1.25	Krak	Fossils- Carbon Dating
60	Wed, Jan 24, 1996	1 hr	Burrows	Chemistry - polymers
61	Wed, Jan 24, 1996	45	Held	Icebergs
62	Tue, Jan 30, 1996	1.75	Taussig	Short Cuts/Circuit breakers
63	Tue, Jan 30, 1996	1.25	Burrows	Lizards
64	Wed, Jan 31, 1996	45	Held	Oil and Water Don't Mix
65	Thu, Feb 8, 1996	2	Taussig	Motors
66	Thu, Feb 15, 1996	1.5	Held	Air Expermints
67	Wed, Feb 21, 1996	1	Held	Cloud in a Bottle
68	Wed, Feb 21, 1996	2.5	Burrows	Partnership Institute
69	Mon, Feb 26, 1996	2	Sticksel	Weather Unit
70	Tue, Feb 27, 1996	2	Taussig	Optics
71	Tue, Feb 27, 1996	2	Sticksel	Weather Unit
72	Wed, Feb 28, 1996	2	Sticksel	Weather Unit
73	Thu, Feb 29, 1996	1	Burrows	Simple Machines - Puff Mobiles
74	Thu, Feb 29, 1996	0.75	Held	Water Cycle - Brainstorming
75	Thu, Feb 29, 1996	3	Taussig	Mirrors
76	Thu, Feb 29, 1996	2	Sticksel	Weather Unit
77	Fri, Mar 1, 1996	2	Sticksel	Weather Unit
78	Wed, Mar 6, 1996	0.75	Held	Build and test water cycles
79	Thu, Mar 7, 1996	2	Sticksel	World of Motion
80	Tue, Mar 12, 1996	1.25	Krak	Moon Phases
81	Wed, Mar 13, 1996	3	Sticksel	Field trip to Franklin Conservetory
82	Tue, Mar 19, 1996	0.75	Held	Static Electricity
83	Mon, Mar 25, 1996	2	Sticksel	Frost Free Day Activity
84	Thu, Mar 28, 1996	2	Taussig	AIMS: Are you square /thats using your head
85	Thu, Apr 4, 1996	1	Held	Puff Mobiles
86	Mon, Apr 8, 1996	2.25	Taussig	AIMS:Gotta Have Heart/Take a breather
87	Thu, Apr 11, 1996	2	Taussig	AIMS: How does your heart rate? - Pulse
88	Thu, Apr 11, 1996	1	Held	Race - Puff Mobiles
89	Fri, Apr 12, 1996	2	Sticksel	Boyer Park Fieldtrip
90	Tue, Apr 16, 1996	2.5	Taussig	AIMS: How does your heart rate? - Lungs
91	Thu, Apr 18, 1996	1.25	Taussig	AIMS: Fingerprinting

1995-1996 BATTELLE - LONGFELLOW PARTNERSHIP VISITS

92	Thu, Apr 18, 1996	2	Sticksel	Boyer Park Fieldtrip
93	Tue, Apr 23, 1996	2.75	Taussig	AIMS: Trait Combos
94	Tue, Apr 23, 1996	0.75	Held	Conductivity
95	Tue, Apr 23, 1996	2	Sticksel	Acid Rain
96	Thu, Apr 25, 1996	2.5	Taussig	Owl Pellets
97	Tue, Apr 30, 1996	1	Burrows	Chicken Eggs
98	Tue, Apr 30, 1996	1.5	Held	Making recycled paper
99	Tue, Apr 30, 1996	1.25	Krak	Dissoloved OXygen
100	Thu, May 2, 1996	1.75	Taussig	AIMS: Space: Galactic Games
101	Thu, May 2, 1996	2	Sticksel	Density of Air
102	Thu, May 9, 1996	2	Sticksel	Dirigibles
103	Fri, May 24, 1996	1.5	Burrows	Chicken Hatching
105	Wed, May 29, 1996	1.5	Held	Slime (with Linda Howard and Kathy Behrends)
106	Mon, Jun 3, 1996	1.5	Burrows	Snakes, Lizards & Turtles
107	Tue, Jun 4, 1996	1.5	Held	Ballooning Up - Making a Gas
		390.5		Total Hours





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EVALUATION OF NETWORK PARTNERSHIPS BY TEACHERS

Quotes from the 1995 Teacher-in-the-Workplace Evaluation of Battelle's Network Partnerships

- Working with scientists from Battelle provides a wonderful experience for children. The area of science isn't always a strength for elementary teachers. I heard a child say "I will never, ever forget this!" (Sharon Bardus, Stiles)

- The scientists break terms down so that kids understand, yet don't talk down to the kids. (Laura England, Linden Park)

- Scientists take kids from the basics to application and problem solving. (Marisa Craig, Linden Park)

- The scientist is a collaborator. While he does not force himself into the classroom, he assimilates what is going on and complements that with his expertise and simply by being himself. Phil comes across as a human being first and then a scientist." (Mark Bach, Longfellow)

- I want my students to know that all people, regardless of gender or culture, can be scientists. The children are always very excited about the scientists coming and continue to talk about them long after the scientists have departed. It is amazing how well the partnership works. (Kim Audi, Longfellow)

- My expectations were more than met! Regarding the partnership, I was both surprised and elated! (Barbara Lewis, Second Avenue)

- The scientist has brought knowledge to life! Pete's expertise expands the curriculum and he can get kids "unstuck." (Charlie Lozano, Longfellow)

- Parents comment frequently about the activities provided by the scientists. "My kid comes home every night talking about the scientist...he won't shut up!"exclaimed one parent. (Charlie Lozano, Longfellow)

- The community influence has an amazing effect on the classroom. Children become aware of the importance of careful measuring, recording, and documenting of data. The scientist was a wonderful role model for the children, and is seen as a "real person." (Mary Petrovich, Longfellow)

- Many new and excing experiences were relayed to the parents as a result of the partnership. Parents reported the excitement of their children and realized the partnership provided unique opportunities. (Mary Petrovich, Longfellow)

- A first grade boy had many technical questions to ask the Battelle scientists. This child actually took home the plans (of the "Subjugator"), revised them, and sent a copy of his

new plans to the scientist! The impact on this child was tremendous! (Mary Petrovich, Longfellow)

- The kids love Paul and openly show affection toward him. The kids begin to see themselves as scientists. They learn to love science, and the comments from them are very positive. (Priscilla Inniger, Longfellow)

- There are more opportunities for the kids because of what the scientist brings with him. (Priscilla Inniger, Longfellow)

- The program has exceeded all expectations! I am thrilled to have the relationship. I would feel a great loss if Paul had to quit the partnership for any reason. (Priscilla Inniger, Longfellow)

- My practices have changed, especially in science. I am feeling more comfortable with science concepts and have developed more self-esteem in teaching science, thanks to my association with Jim (Saunders). (Denise DuCharme, Stiles)

- Most importantly, the scientists are able to show connections to the real world. Britt frequently tried to connect what the kids were doing in the classroom with what she was doing on the job at Battelle. Students learn through discovery and exploratory science that teamwork and problem solving are important skills. (Deena Moore, Stiles)

- The partnership has been a very positive experience for me. Students need to see how their learning and interactions relate to the real world. This has to come from someone "out there..." (Deena Moore, Stiles)

- Perceptions of scientists changed as a result of the partnership. After the students became acquainted with the scientists, they were amazed to discover they were "normal" people. Additionally, they were quite surprised to discover a woman could be a professional scientist! (Laura England, Linden Park)

- During my math lessons, students often apply what they have learned from Al (Hopper). (Laura England, Linden Park)

- The partnership helps my students see the value of an education and the practical side of learning. Scientists take kids from the basics to application and problem solving. (Marisa Craig, Linden Park)

- I have noticed increased career awareness among all students, with a major impact on girls and culturally deprived students. (Ann Cameron, Stiles)

- This year's fifth graders have been at Longfellow since the first grade. This is our "baseline" class (for measuring the impact of partnerships). Dr. Taussig sees a noticeable increase in knowledge and skills. (Charlie Lozano, Longfellow)

LINDEN PARK ELEMENTARY SCHOOL

Linden Park IGE (Individually Guided Education) has been in partnership with Battelle scientists since 1992, with a mathematician or scientist involved at each grade level except kindergarten. Attached are indicators of the success of this involvement: math scores of the 1991 class from third through fifth grade, and science proficiency test scores for the l996 fourth grade class.

P:03
TEL:

Linden Park Alternative School Student Demographics

Racial Composition

Gender

Lunch Status

Grade

OCT-29-96 16:35

Prepared by Office of the Superintendent
Department of Program Evaluation

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COLUMBUS PUBLIC SCHOOLS

MAT7 NORMAL CURVE EQUIVALENT (NCE) SCORES IN MATHEMATICS
OF FIRST GRADE CLASSES AT LINDEN PARK ALTERNATIVE SCHOOL

	1	2	3	4	5
MATHEMATICS:					
90-91 1ST GRADE CLASS			62	59.7	64.8
MATHEMATICS CONCEPTS:					
90-91 1ST GRADE CLASS			51.8	54.2	65.8
MATHEMATICS COMPUTATIONS/PROCEDURES:					
90-91 1ST GRADE CLASS			57.9	62.5	63.4

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FOURTH-GRADE PROFICIENCY TESTS

Columbus Public Schools — March, 1996

	A		B		C		D		E	
1	Writing		Reading		Math		Citizenship		Science	
2	88	Oakmont	92	Kenwood	86	Colerain	93	Duxberry Park	75	Linden Park
3	87	Indian Spring	91	Duxberry Park	83	Duxberry Park	92	Stewart	75	Duxberry Park
4	85	Duxberry Park	87	Gladstone	82	Douglas	92	Kenwood	71	Kenwood
5	83	Linden Park	87	Douglas	82	Clinton	91	Clinton	71	Douglas
6	83	Alpine	86	Stewart	79	Oakland Park	90	Oakland Park	71	Colerain
7	82	Easthaven	86	Colerain	77	Gladstone	90	Alpine	68	Berwick
8	82	Berwick	85	Indian Spring	77	Berwick	88	Berwick	65	Alpine
9	81	Olde Orchard	84	Valley Forge	77	Alpine	87	Linden Park	64	Clinton
10	81	Oakland Park	83	Oakland Park	76	Kenwood	87	Indian Spring	63	Indian Spring
11	81	Gables	83	Linden Park	75	Scioto Trail	86	Gables	60	Gladstone
12	80	Valley Forge	82	STATE AVG.	75	McGuffey	85	STATE AVG.	59	STATE AVG.
13	80	Moler	82	Easthaven	73	STATE AVG.	84	Valley Forge	58	Oakland Park
14	80	Maybury	82	Berwick	73	Cranbrook	84	Moler	57	Maybury
15	80	Arlington Park	81	Scioto Trail	72	Gables	84	McGuffey	54	Gables
16	79	STATE AVG.	81	Cedarwood	71	Stewart	84	Douglas	54	Avalon
17	78	Binns	81	Alpine	71	Easthaven	83	Gladstone	51	Stewart
18	77	Devonshire	80	Clinton	70	Salem	82	Northtowne	50	Indianola
19	76	Kenwood	79	Oakmont	70	Linden Park	82	Maybury	49	Binns
20	76	Indianola	79	Gables	69	Valley Forge	81	Georgian Hts	48	Winterset
21	75	Forest Park	79	Brentnell	69	Indianola	81	Devonshire	48	Georgian Hts
22	74	Georgian Hts	78	Olde Orchard	68	Moler	80	Easthaven	47	Valley Forge
23	73	Stewart	78	Devonshire	67	Olde Orchard	80	Avalon	47	North Linden
24	72	West Broad	78	Binns	67	Maybury	79	Olde Orchard	46	Scioto Trail
25	71	Innis	76	Maybury	67	Huy	78	Scioto Trail	46	Olde Orchard
26	71	Douglas	76	Indianola	67	Cedarwood	78	Indianola	45	Northtowne
27	71	Colerain	76	Avalon	67	Brentnell	77	Medary	45	Cedarwood
28	70	Winterset	74	Georgian Hts	66	Georgian Hts	77	Cedarwood	44	Maize
29	70	Scioto Trail	73	Ohio Ave	65	Avalon	77	Brentnell	43	Easthaven
30	70	Gladstone	73	Northtowne	64	Northtowne	76	Oakmont	41	Oakmont
31	69	Maize	72	Innis	64	Indian Spring	76	Innis	41	Hudson
32	69	Livingston	71	Stockbridge	64	Devonshire	75	Koebel	41	Forest Park
33	69	Cranbrook	69	Maize	63	Winterset	74	Huy	40	McGuffey
34	69	Brentnell	68	Medary	63	Koebel	72	Winterset	39	Salem
35	69	Avalon	67	Scottwood	63	Binns	72	North Linden	39	Lindbergh
36	68	Huy	67	Koebel	58	Oakmont	71	Forest Park	38	Liberty
37	67	Scottwood	67	Hudson	58	Medary	71	Colerain	37	West Broad
38	67	Cedarwood	66	Salem	57	Hudson	70	West Broad	37	Fifth Ave
39	66	Cassady	65	Winterset	57	Burroughs	70	Salem	37	Brentnell
40	65	Ohio Ave	65	Shady Lane	56	Avondale	69	Fifth Ave	36	Moler
41	65	Main Street	65	Huy	55	Ohio Ave	69	Cranbrook	36	Devonshire
42	65	Highland	65	Cranbrook	54	Leawood	69	Burroughs	35	Stockbridge
43	64	Liberty	65	Burroughs	53	Westgate	69	Binns	35	Leawood
44	62	Shady lane	64	West Broad	53	Shady Lane	68	Liberty	34	Westgate
45	62	Fairmour	64	Parkmoor	53	Maize	67	Shady Lane	34	Innis

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FOURTH-GRADE PROFICIENCY TESTS

Columbus Public Schools

March, 1996

	A		B		C		D		E	
47	60	North Linden	64	Eakin	53	East Linden	67	Deshler	33	Fairmoor
48	59	Salem	64	DIST. AVG.	53	DIST. AVG.	66	Scottwood	33	Eastgate
49	59	Koebel	64	Clarfie	52	Forest Park	66	Fairmoor	33	DIST. AVG.
50	58	Parkmoor	64	Cassady	51	Innis	66	DIST. AVG.	33	Clarfield
51	58	Fairwood	63	Livingston Ave.	51	Fifth . . e.	65	Stockbridge	32	Pilgrim
52	57	Stockbridge	63	Highland	51	Eakin	65	Pilgrim	32	Medary
53	57	Pilgrim	63	Heyl	50	Franklinton	65	Hudson	32	Burroughs
54	57	Como	62	Liberty	49	Fairmoor	64	Clarfield	31	Como
55	56	Westgate	61	Westgate	48	West Mound	64	Cassady	30	Huy
56	56	West Mound	61	North Linden	48	Highland	63	Ohio Ave.	29	Main Street
57	56	Medary	61	McGuffey	48	Cassady	63	Livingston Ave.	28	Shady Lane
58	56	Kent	60	Eastgate	47	West Broad	63	Broadleigh	28	Livingston Ave.
59	56	Hamilton	60	Como	47	Como	62	Kent	27	Koebel
60	56	Clarfield	59	Kent	45	Livingston Ave.	62	Eakin	27	Cranbrook
61	55	Fifth Ave.	59	Forest Park	45	Lindbergh	62	Como	26	West Mound
62	55	Burroughs	57	Pilgrim	44	North Linden	61	Parkmoor	25	Scottwood
63	54	Leawood	57	Leawood	44	Clarfield	60	Maize	25	Ohio Ave
64	53	Hudson	57	Franklinton	43	Stockbridge	60	Leawood	24	Southwood
65	53	Heyl	56	Moler	43	Pilgrim	59	Franklinton	24	Broadleigh
66	52	Second Ave.	55	Deshler	42	Hubbard	57	Beck	23	Siebert
67	52	Clinton	55	Broadleigh	42	Deshler	56	Westgate	23	Hamilton
68	51	Windsor	55	Avondale	41	Reeb	56	West Mound	23	Cassady
69	51	Eakin	54	West Mound	41	Linden	56	Linden	21	Kent
70	50	Southwood	54	Siebert	41	Dana	55	Lindbergh	21	Avondale
71	50	Northtowne	51	Fifth Ave.	40	Southwood	55	East Columbus	20	Fairwood
72	50	Hubbard	50	Second Ave.	40	East Columbus	54	South Mifflin	20	East Linden
73	49	Dana	50	Lindbergh	39	Parkmoor	54	Heyl	18	Parkmoor
74	48	McGuffey	49	Windsor	39	Hamilton	51	East Linden	18	Heyl
75	48	Eastgate	49	South Mifflin	38	Siebert	50	Siebert	18	Deshler
76	48	Avondale	49	East Linden	38	Scottwood	50	Eastgate	18	Beck
77	46	Beck	48	Fairwood	37	Broadleigh	50	Avondale	17	Eakin
78	41	Franklinton	48	Beck	36	Fairwood	49	Reeb	16	Linden
79	41	Deshler	48	Arlington Park	35	South Mifflin	49	Hamilton	16	Franklinton
80	40	Trevitt	46	Trevitt	35	Kent	46	Southwood	15	Trevitt
81	40	East Columbus	46	Southwood	34	Beck	46	Arlington Park	15	Dana
82	38	East Linden	46	Hamilton	33	Main Street	44	Hubbard	13	Windsor
83	37	Reeb Ave.	44	Hubbard	33	Eastgate	43	Second Ave	13	Reeb
84	37	Lindbergh	42	Main Street	30	Weinland Park	43	Dana	11	Weinland Park
85	35	South Mifflin	41	Reeb	29	Heyl	42	Weinland Park	11	Hubbard
86	35	Siebert	39	Linden	28	Windsor	42	Main Street	09	East Columbus
87	35	Linden	39	East Columbus	27	Trevitt	42	Fairwood	07	Second Ave
88	35	Lincoln Park	34	Dana	25	Second Ave.	41	Trevitt	07	Arlington Park
89	33	Fair	32	Weinland Park	25	Arlington Park	31	Windsor	06	South Mifflin
90	33	Broadleigh	31	Lincoln Park	24	Sullivant	29	Sullivant	06	Lincoln Park
91	29	Sullivant	30	Fair	22	Lincoln Park	26	Lincoln Park	05	Fair

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Development of Business Professionals through School-based Partnerships

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Background

In 1991, the Secretary's Commission on Achieving Necessary Skills of the U.S. Department of Labor released the report, *What work requires of schools: A SCANS report for America 2000*. The report is an examination of changes in the workplace and the implications of those changes for education and business. The report charges that more than half of young people leave school without the knowledge or foundation required to find and hold a good job and that, as a result, individuals and businesses will pay a high price. After all, low skills lead to low wages and low profits.

Employers and employees agree that the workplace requires workers not necessarily to work harder, but certainly to "work smarter." To enable this, the SCANS report identifies five competencies and a three-part foundation of skills and personal qualities which "lie at the heart of job performance today" (p. vi). This template of job-related competencies and skills is recommended as an integral part of each student's school-based education. Further, businesses are challenged to develop this know-how in their employees or to risk decline.

The question arises, then, of how to develop these job-related skills and competencies in today's employees. Some argue that classrooms are not conducive to providing adequate skill development. Employers should, therefore, participate in programs to bring about the professional development of their employees.

A promising mechanism for employee development is engaging in school-based partnerships. School-based partnerships involve long-term, collaborative relationships among individual teachers and business or agency employees. These relationships go beyond the "adopt-a-school" and "project" approaches of the past two decades. Today's school-based partnerships are aimed at impacting the curriculum and student learning by introducing innovations in teaching and learning which are in line with the goals and directions of national reports.

Partnerships between schools and agencies have been advocated as a means of enhancing education for the past decade. There is increasing evidence that school-based partnerships are also an effective mechanism for the professional development of teachers. Based on five years of experience with school-based partnerships, we question if the benefits of partnering extend beyond teachers and students to business/agency professionals as well. That is, school-based partnerships may provide a mechanism for developing the job-related skills and competencies in the labor force which are identified by the SCANS report. It is important, therefore, to more fully understand the direct impact of the partnership on the development of business/agency professionals involved in those relationships.

Purpose

The purpose of this study was to describe how, if at all, the job-related skills and competencies of business/agency professionals are impacted by participation in school-based partnerships.

Methods

Sample. The business/agency professionals participating in the partnerships represented three main professions or agency types: natural resources agencies (n=73), business and industry (n=64), and healthcare professionals (n=20). A purposive sample was drawn from among the business/agency professionals, representing approximately ten percent of each group. Individuals were selected to participate in the study if they were deemed to be engaged in "good" or "active" partnerships by individuals who initially trained and subsequently supervised the partnership teams. Further, a balance of male and female representatives was selected when possible (all healthcare professionals were females.)

The participants in this study were seven natural resource professionals (4 females, 3 males), six business partners (2 females, 4 males), and five female healthcare professionals. Partnership teams were involved in 32 elementary school classrooms, including 18 primary classrooms (grades 1-3), 13 intermediate classes (grades 4-6), and one special education class. Although the partnership teams ranged in size from two members (one teacher and one business/agency professional) to 12 members, 14 teams (77.7%) had five or fewer members. Teams had been engaged in partnering for one to five years with an average of 2.2 years in existence. Most participants related their partnerships as "active" (10 teams, 55.5%) or "very active" (7 teams, 38.8%), and all were either "satisfied" (3 participants, 16.6%) or "highly satisfied" (15 participants, 83.3%) with their partnering experience. Further, all 18 business/agency professionals interviewed stated that "yes, definitely" they would recommend partnering to their colleagues and agency.

Data gathering and analysis. To investigate the impact of partnering on the professional development of business/agency professionals, the SCANS report was used as a standard. A 40-minute telephone interview was developed, focused on three competencies (resources, interpersonal, and information) and three foundational skills (basic skills, thinking skills, and personal qualities) identified in the report. Twenty-five subcategories were contained within these six SCANS categories. Participants were asked to self-report how much, if at all, each skill or competency had been impacted ("decreased skill or competency" to "very significant enhancement of the skill or competency"), to provide examples of transfer to the workplace, and to attribute the skill change to something in the partnership experience. Interviews were conducted by three independent researchers, transcribed, and content analyzed for themes. Self-reports of change were quantified and means and magnitudes were calculated.

Results

The results presented here are delimited to only the self-report of how job-related skills and competencies were impacted for business professionals engaged in partnerships. Overall, the business professionals reported significant change in 8 of the 25 subcategories of competencies and skills (32.0%). In only three of the subcategories, (12%.0), was no change or impact reported. Content analysis revealed a profile of change in business employees focused on four themes. These suggested that, as a result of engaging in active partnerships, business professionals were:

1) a different kind of employee, and:

- more confident in working with others and more of a "self-starter";
- showed more leadership in using human resources, accepting responsibility and taking initiative, more adept in negotiating toward a goal;
- better able to function as part of a team;
- better able to resolve conflicts and engage in creative problem solving;
- more satisfied and motivated.

2) interacting differently with others in the workplace, and:

- are more sensitive to others, especially those of different gender or cultures;
- have an enhanced view of others, including their depth and their needs;
- have a realization of the impact their interaction style has on others, therefore more patient and willing to mentor;
- are better at listening to others, including verbal and nonverbal communications

3) "working smarter," and

- planning and setting goals more readily and effectively;
- managing materials more effectively
- accessing the Internet more frequently

4) communicating more effectively, and

- are more comfortable making presentations, organizing concepts, reading body language, and using a variety of presentation strategies;
- articulating positions and points in the workplace, both formally and informally.

Conclusion

The results of these interviews and supporting documentation suggest that development of job-related skills and competencies did occur for those employees engaged in active, school-business partnerships. The impact was greatest in two areas: enhanced communication and interaction skills, and enhanced leadership skills.

Selected Quotes from Business/Agency Professionals

"Through the partnerships, I've learned the importance of asking questions. In the schools it's okay to ask questions. I used to feel guilty if I asked about things that I thought I should know the answers to. Not anymore."

"Partnering has opened my eyes to being flexible. For example, I had planned to give a workshop outside, but it rained. I adapted my plans in 10 minutes. In the past, I would have lost it if things didn't run my way. I attribute (my greater flexibility) to working with my partner teachers."

"The partnership has helped my work with women. I have this preconceived notion that I don't understand women. I have learned that men and women communicate differently and I am getting better at understanding women. I am getting better at communicating with my wife. This is happening because I work with female teachers."

"I have learned to listen for signs that I may not be 'getting through' with people in the workplace as a result of watching kids in the classroom. I listen and adjust better now."

"The change in the way I exercise leadership is very noticeable! I used to hear in my review that I needed to take initiative with people and show leadership. (As a result of my partnering work), I have been doing better and my boss has noticed."